2002

The impact of trauma nursing case management on selected patient outcomes :

Kate Curtis
University of Wollongong

THE IMPACT OF TRAUMA NURSING CASE MANAGEMENT ON SELECTED PATIENT OUTCOMES

A thesis submitted in partial fulfilment of the requirements for the award of the degree

MASTERS OF NURSING (Hons)

from

UNIVERSITY OF WOLLONGONG

by

KATE CURTIS, BN, Grad Dip Crit Care

DEPARTMENT OF NURSING

2002

CERTIFICATION

I, Kate Curtis, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Masters of Nursing (Hons), in the Department of Nursing, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Kate Curtis
June 2002

List of Abbreviations

ACCC	Australian competition consumer commission
AH	Allied health
AN-DRG	Australian national diagnostic related group
AR-DRG	Australian refined diagnostic related group
CNA	Canadian Nurses Association
DRG	Diagnostic related group
EDIS	Emergency department information system
ENA	Emergency Nurses Association
HOSPAS	Hospital patient administration system
ISS	Injury Severity Score
LOS	Length of stay
MBS	Medicare benefits schedule
MCO	Managed care organization
MDC	Major diagnostic category
MRN	Medical record number
NHS	National health system
OT	Occupational therapy or Occupational therapist
TCM	Trauma Case Management
UK	United Kingdom
US	United States

Acknowledgements

I would like to acknowledge the assistance of many people who supported and encouraged me in the completion of this thesis.

My supervisor Dr John Sibbald for his persistence, guidance and advice in preparing the thesis for submission

Dr Richard Morris for his constant support, encouragement, feedback, methodological and statistical assistance in our weekly Tuesday meetings.

The Department of Nursing at the University of Wollongong for providing a supportive study environment and financial support in the form of part-time teaching.

Ms Tracy Garnam and Ms Cathy Walsh for assistance in the library, expertise in document formatting, and data entry.

The St George Hospital, in particular Dr Adam Chan and Ms Sue Bunt for their interest, belief in and support of this project.

Dr Brian McCarthy and Mrs Kerrie McCarthy for inspiration, encouragement, patient proof reading and provision of childminding.

Mr Peter Curtis and Mrs Gillian Curtis for even further encouragement, tolerance, patience and childminding.

My wonderful husband George Curtis for being tremendously patient and attentive. Also for being unrelenting in his support, encouragement, sense of humour and kindness.

My beautiful, precious daughter Sarah Isobel who gave me a lot of big hugs and always managed to make me smile.

Abstract

Aim

The decision was made to implement Trauma Case Management (TCM) at a tertiary trauma centre as a result of the identification of many communication and patient care issues. Investigation into these issues prior to the commencement of a TCM pilot study found that the majority of 104 respondents to a staff satisfaction survey of trauma patient carers felt that trauma patient care was disorganised.

The pilot study explored whether further investigation would be worthwhile undertaking to evaluate the efficacy of TCM. To do this, an Inception Cohort Study was implemented, using historical controls. The hope was that such a study would show trends, which would indicate whether a larger trial was justified.

The purpose of the pilot study was to determine the effect of TCM on patient outcomes including length of stay (LOS), in-hospital complications and missed injury detection rates. Other tools including staff satisfaction in relation to the care of trauma patients, the use of allied health personnel amongst trauma patients, and clinical coding accuracy were examined. In addition to overall LOS, the LOS of specific subgroups was examined, including age groups below and above 50 years and patients with an Injury Severity Score (ISS) less than 8 and between 8-15 (inclusive). Patient's with an ISS between 8-15 were more likely to have multiple injuries, and thus need more coordination.

Methods

Potential patients for study inclusion were identified by the case manager at the beginning of each shift. The case manager checked every patient admission to the Emergency Department (ED) using the computerised "EDIS" system, which contains information on each patient's reason for presentation to the ED. Patients were then included if they fulfilled trauma data base entry criteria which requires the patient to possess one characteristic from three possible fields. The fields are "mechanism of injury", for example a motor vehicle collision at speed > 60 kph, "vital signs", for example decreased level of consciousness or "injuries", for example an injury to two or more body regions.

The trauma case manager performed a daily round of all patients fulfilling criteria. The Trauma case manager had a checklist of interventions that were conducted including ensuring the patient had completed all necessary radiological investigation prior to ward transfer, ensuring the documentation of a management plan for the patient, and the charting of appropriate and adequate pain relief. As part of the round, the TCM completed a progress sheet of any interventions performed, and collected information for the trauma database.

The daily progress record kept by the trauma case manager was provided to the clinical coding department on patient discharge. This was to assess the impact of the provision of the trauma case manager record on clinical coding accuracy. It was planned to conduct a retrospective audit and comparison of

clinical information coding prior to and after the provision of the trauma case manager notes.

Results

The results showed a decreased LOS overall, but most apparent in older patients or those with more severe or multiple injuries. The missed injury detection rate increased significantly but the in-hospital complication rates were unchanged overall. The more elderly patient group however demonstrated a much lower in-hospital complication rate. The use of Allied Health services increased significantly and earlier referral to allied health services exhibited. Staff support for TCM was overwhelming.

In addition, during the pilot period, the clinical coding entries for 100 trauma patient admissions were audited. equating to 15% of overall admissions for the year 2000. Many clinical coding errors and omissions were noted. 28% of recoded records had to have their Diagnostic Related Group (DRG) changed, which resulted in the identification of over $39,000 of potential funding

Conclusion

This pilot study has shown that TCM significantly improves Allied Health use and increases the detection of missed injuries. TCM improves staff satisfaction, communication and medical record documentation. Some of the benefits of TCM such as improved teamwork, coordination, staff morale and patient satisfaction may be difficult to quantify on a cost-benefit level. This pilot study prepares the ground for a more detailed analysis of the role of TCM on quality patient outcomes and resource use.

TABLE OF CONTENTS

Tables.

1 - Introduction

This chapter provides examples of coordination issues in the provision of trauma patient care which in turn provides the rationale for a trial of trauma case management (TCM). A description of the development of the TCM is given as well as its role in resolving coordination issues are discussed. Finally, the purpose of the study is outlined.

As a result of clinical experience in the area of trauma care, the author is aware of the frequent problems associated with trauma care delivery. The trauma patient generally requires several medical and ancillary teams involved in their care as a result of having injured a number of body regions. The following example of care providers required for a multi-region injured trauma patient is not uncommon.

The general surgeon would address the patient's abdominal injury whilst the orthopaedic surgeon would manage the limb fracture and the plastic surgeon supervise the complex facial laceration. The nurse acts as a patient advocate and provides generalised care such as wound dressings, administering medication and psychological support. In addition, the physiotherapist is required to help mobilise the patient, the occupational therapist is needed to provide post traumatic amnesia assessment and the social worker manages sickness benefits and insurance claims. Furthermore, the pain team assists in providing advice on the most appropriate analgesia, while the alcohol and other drugs team would provide guidance on aiding the patient's nicotine withdrawal. As becomes evident, caring for the trauma patient is complex and requires

abundant coordination, however this does not always occur.

There is a need for a solution to the fragmented care experienced by complex patient groups such as trauma patients. Schoenbaum (2000) states that while patients may be satisfied with each individual health professional, they recognise that the overall episode of care is often poorly coordinated or managed. King (1990) adds that the complex health care needs of individuals, families, communities and populations are not usually amenable to the actions of a single health care discipline. This suggests that patients require the services of a multidisciplinary team, which in turn raises the issue of team coordination. The nursing case management model is one method of care delivery which can address patient care coordination concerns.

The case management model, which involves the coordination of patient care is used for selected complex patients or populations, such as trauma, oncology, mental health and cardiac groups. These complex, high cost groups that require multiple procedures, interventions and resources, benefit most from case management. Allred et al. (1995) conducted extensive research into the effectiveness of nursing case management in varying acute care settings by examining patient care outcomes such as length of stay and patient satisfaction. They found that nursing case management is more cost effective in a nursing practice environment of moderate uncertainty, such as with a complex patient. This equates to a working environment which necessitates nursing staff requiring more sophisticated knowledge and organisational skills. In addition, when caring for a complex patient, nurses require more information from and communication with treating medical teams.

Trauma case management (TCM) is a system where one person, the nurse case manager, oversees and coordinates patient care. The Emergency Nurses Association (ENA) of the United States (US) (1999) in their guidelines for the implementation of TCM describe it as able to promote teamwork and coordination, and improve financial performances by decreasing length of stay, preventing duplication, and streamlining resource use. In addition, the ENA claims that TCM improves the quality of patient care, which leads to improved patient and staff satisfaction. Furthermore, TCM facilitates the achievement of quality, clinical and cost outcomes by negotiating, arranging and coordinating services and resources needed by the patient, and intervening at key points in the care process (ENA 1999).

Examining the application of TCM from a global perspective, it is evident that TCM has been practiced in the US since the early 1990's. Unfortunately, the US has remained the only health care system to have formally embraced TCM. In the United Kingdom (UK), Adams & Bond (1995) state that functional, team and primary nursing remain dominant in nursing, even though newer systems such as case management are beginning to emerge (cited in Adams, Bond, & Hale 1998). This is confirmed by Burns et al (1999) who reported that case management is now well entrenched in mental health and community nursing in the UK. Waterman, Waters, & Awenat (1996) confirmed that this is also the case in Australia. The Case Management Society of Australia (2001) state that case management is now widely embraced across diverse settings in the human services and health sectors. However, the nursing case management model adoption to trauma care has yet to occur and explained in both UK and

Australian literature. It is significant that case management has been recognised as an effective model of care for mental health and community patients, as they possess similar characteristics to trauma patients. Each of these patient groups is complex, requiring multidisciplinary care and extensive planning of care. Critical pathways are one tool that has been used for streamlining and attempting to improve patient care delivery.

As will be discussed, a number of authors have investigated the impact of trauma clinical pathways on patient outcomes such as in-hospital complication rates and length of stay. However there is a lack of significant evidence to demonstrate the effectiveness and contribution of the Trauma Case Manager to patient care and trauma patient outcomes.

Many of the interventions performed by the trauma case manager on their daily review of the patient can be grouped into the following categories:

- Identifying and addressing any conflict in medical orders or lack of management plan;
- Collaborating between multiple care givers and fostering; communication between medical teams and nursing staff;
- Identifying barriers to discharge and contacting relevant personnel to overcome these;
- Organising pathology or radiology and subsequent review in priority cases;
- Documentation in medical notes of any intervention or alteration in patient care;
- Informing the multiple teams, nursing and allied health staff, and the patient of any new development;
- Building a rapport by providing continuity of care with patients and acting as their advocate;
- Reassuring patients by ensuring they and their families are kept well informed.

The literature and the author's own empirical observation suggest that trauma care in Australia would benefit from the increased communication and coordination that the introduction of TCM would provide.

1.1 Thesis overview

Hence, the aims of this thesis are to analyse the impact of Trauma Case Management (TCM) on selected patient outcomes including length of stay (LOS), in-hospital complications and missed injury detection rates. In addition, this study sought to identify the impact of the implementation of TCM at a tertiary trauma centre on patient outcomes such as in-hospital complication rates, missed injury detection rates, length of stay (LOS), and the rate of allied health staff referral (for example physiotherapy) among trauma patients. Other tools to measure the impact of TCM on the institution were staff satisfaction and clinical coding accuracy.

In an attempt to provide an analysis of the causes of trauma patient care issues, and the origin of trauma patient care solutions a review of pertinent literature is provided in chapter 2. This review highlights the need for streamlined care, clinical coding accuracy and clinical governance in a financially struggling health care system. The development of nursing case management is discussed in relation to relevant nursing theories. Examination of trauma as a global disease and trauma patient characteristics demonstrate the need for well coordinated trauma patient care.

The methods used to determine whether nursing and medical staff at a tertiary trauma centre shared the perception that trauma patient care could be improved were focus groups and a staff survey, described in chapter 3. The staff survey also examines staff satisfaction. In chapter 4, the trauma case management pilot study methodology is provided, in particular, liaison with the casemix unit and the trauma service database were used to determine LOS, missed injury,

complication and allied health staff referral rates. The clinical coding department assisted in auditing clinical coding accuracy.

The study results are presented in chapter 5 and discussed in chapter 6. A summary and explanation of study limitations and recommendations are provided in chapters 7 and 8.

In summary, an overview of the need for increased coordination of trauma patient care has been demonstrated. A description of TCM and its role in resolving coordination issues were discussed, the purpose of the study and structure of the thesis outlined.

2 - Literature Review

2.1 Current Health Care Problems

Australia's health care system is under financial stress and moving towards the style of managed care for health service provision used in the USA. Scotton (1995), in reviewing issues in the Australian health care system states that this is occurring for several reasons, both monetary and quality oriented. National level causes of stress are increases in costs of state of the art health care, especially for the elderly, because of the advances in medical knowledge and technology. In addition, slower rates of economic growth over the last two decades have resulted in rising health expenditure (Scotton 1995). In addition, there is an uneven uptake of research findings across health care settings, not only in Australia, but also across specialties and across countries.

Eccles (2000) in presenting a researcher's view of the reasons evidence is not used in daily practice, at the 2000 Institute for Clinical Systems Improvement's Colloquium on Clinical Quality Improvement comments that despite research providing evidence for a particular treatment, there is a lack of implementation of this new practice, and little ability for any professional body to enforce it. This variation in practice does not necessarily equate to poor care, however a lack of current evidence based practice is resulting in inappropriate care (Eccles 2000). Managed care attempts to address this issue by streamlining care and providing best practice guidelines. Variation in practice is also reflected in variation in cost of practice.

As part of a review of the NSW Health Care system Menadue (2000) highlights the increase in cost in health care with the following statistics. In NSW, about 24% of the state budget is spent on health. While only 12% of the population is admitted to hospital in any one year, public hospitals absorb about 57% of total NSW health expenditure. Moreover, the current method of funding is historic and takes insufficient account of a hospital's real performance, whether the number of admissions is appropriate, or whether the cost of treatment is consistent between hospitals. In 1997-98 the NSW rate for overnight hospital admissions was 157 (per 1000 population) (Menadue 2000) compared with 105 in Canada, 116 in the US and about 130 in the UK. Yet there is an increasing demand for hospital beds, and the more in-hospital facilities that are provided, the more they will be used. In addressing an Australian Private Hospital National Congress, Berger (2000) discussed the application of the US managed care model in Australia and suggested that the increased usage of hospital beds displaces the focus of movement of resources to provide more community based care, early prevention and services to keep people well.

To address many of the aforementioned issues, the NSW minister for health established the NSW Health Council in July 1999. The Council was required to undertake a review of the NSW Health Care system and deliver a plan to provide effective strategies to improve the delivery of quality health services, better manage costs, and improve the health outcomes of people in metropolitan, regional and rural NSW (Menadue 2000). After nine months of extensive consultation throughout the health care system and the community, in response to concerns regarding complex patient groups, such as oncology or trauma, the NSW Health Council (2000), made several recommendations.

Firstly, that service delivery would be improved by better management, funding and coordination of critical care units and that the coordination of care of people with chronic and complex conditions should be addressed. Secondly, the council recommended that clinical case management should be more widely used in all NSW public hospitals for patients having very complex treatment. Finally, Menadue (2000) added that episode (casemix) funding can provide powerful incentives to implement desired clinical practices.

Menadue & Kibble (2000) who are the authors of the NSW Health Council report, recommended more than 100 changes to the current methods of delivery of health care, yet failed to suggest strategies for change. This is despite the primary objective of the health council being "to deliver a plan to the NSW Minister for Health that provides effective strategies to improve the delivery of quality health services, better manage costs, and improve the health outcomes of people in metropolitan, regional and rural NSW." (pviii) Whilst the report acknowledges that "we have not had time to sketch out how this might be achieved...it will require the highest level of commitment and leadership from clinicians and local managers" (pv), perhaps the lack of strategies could be partly attributed to the chairman and deputy chairman of the Health Council (Menadue & Kibble) and of six of twelve council members having no health experience.

Eccles (2000) however cited several change strategies at the 2000 International Colloquium on Clinical Quality Improvement, at which the key speakers had extensive research, health and health management experience. These included

professional interventions, conferences, provider-oriented organisational interventions such as clinical multidisciplinary teams, formally integrated services and continuity of care strategies. At the same colloquium, Palmersheim, Eccles & Bisognano (2000 p557) add, "that the most under-utilised resource in the health care industry is the passion of the people who came to work in health care in the first place". It will be these people who innovate and implement change, "it's very hard work, but it's exciting, it's rewarding, it's about building the future". The changes suggested by these authors can be addressed by many elements of clinical governance, one of which is more careful scrutiny of clinical practice.

2.1.1 Clinical Governance

Clinical governance in both the UK and Australia refers to the means by which an organization ensures the provision of quality clinical care by making individuals accountable for setting, maintaining and monitoring performance standards (Dean 2001). Nursing case management is an effective tool to address many of the issues targeted by clinical governance, such as variations in service, poor practices, increasing LOS and coordination, and could be included as part of a clinical governance program.

In the United States and more recently the United Kingdom (Ellis 2000) and Australia, Pickersgill (1998) in her paper explaining how clinical governance will achieve improved service for patients in the UK states that clinical governance has been introduced in an effort to address longstanding problems in the health care system such as variations in service, poor practices, and rationing and

lengthening waiting lists. In addition in the UK, Rosen (2000) examines the definition and implementation and clinical governance's integrated approach to quality. Rosen adds that clinical governance attempts to make health care organisations more accountable for local and institutional quality, improve consistency using evidence and best-practice based care, benchmarking and evaluation.

The use of clinical paths, also known as care maps, in conjunction with nursing case management would assist in obtaining many of the goals of clinical governance at a local level. The effective collection of variances and outcome data would contribute at a national level if appropriate measurement and analysis systems were in place. In the UK, given that only NHS organisations are required to conform to clinical governance practice, and that they are required to implement resource intensive plans with existing resources, it may take some time for the potential positive results of clinical governance to become evident (Rosen 2000).

In a major metropolitan city's area health service, the Quality Council considers clinical governance to be central to the provision of quality services, and in early 1999 conducted a review of existing services for ensuring quality of clinical care (Warner 1999). Dean (2001) convened a "health roundtable" for all Australian hospitals in June 2001 entitled "How to improve Clinical Governance". Its aim was to facilitate collaboration between Australian hospitals in developing and implementing the clinical governance process

It is reassuring to be aware that the health care issues of funding, variation in

practice, and coordination of complex patient groups are not confined to Australia. In an attempt to improve the effectiveness, accountability, standard and cost efficiency of health care, many countries, such as the US, Great Britain and Canada have introduced various forms of managed care (Pierce 2000). Australia has the opportunity to learn from and potentially adopt certain aspects of managed care that will be relevant for itself. Groups such as the NSW Health Council, The Australian Centre for American Studies at the University of Sydney and the Centre for Hospital Management and Information Systems at the University of NSW investigate and assess the models used, systems implemented and resultant experiences of other countries utilising managed care.

2.2 Managed Care

Managed care is an arrangement that the hospital or organisation has with a health insurance company or government agency. The organization, for example, the area health service, assumes responsibility for all necessary health care for an individual in exchange for a fixed payment. The size of the payment is based on diagnostics related groups (DRG), or other criteria that the patient fulfils (Duckett 1997). The funding an institution is allocated for a funding period, for example 1 year, is based on a projection of DRGs and Emergency presentations. The determination of DRGs and projections will be discussed in an Australian context shortly.

It is important to have an understanding of managed care because ultimately it is what drove the development of nursing case management. A health system which focuses on cost required care delivery strategies which were cost

effective and positively affected patient, caregiver and system outcomes required assistance. In an attempt to deliver these objectives, strategies such as product line management followed by case management were introduced.

In the US in 1989, legislation was introduced that physicians would be paid based on resources needed to perform services. This resulted in decreased payments for surgical procedures and increased payments for evaluation and management services (Uzych 1996). Duckett (1997) in a commentary on prospects for managed care in Australia and a review of policy issues surrounding the introduction of managed care states that managed care is not popular amongst US physicians, as it is regarded as an undesirable infringement on autonomy. Resentment exists against conformity and financial commitment to managed care protocols. A managed care protocol would determine for the physician which treatment a patient would receive for their documented condition, and how much the physician would be paid for that treatment. Duckett (1997) goes on to explain however, that expert clinicians employed by managed care organisations develop the protocols in an effort to provide evidence based care and ensure that patients receive scientifically based treatment. This attempts to prevent out of date, ineffective treatments being imposed on the patient (Scotton 1995), which is also an aim of trauma case management

Initially, managed care involved development of clear protocols for what symptoms and signs should be present before a patient within a managed care program was admitted to hospital. Protocols have now been developed for out-of-hospital treatment, including which drugs should be used for certain

conditions and when allied health staff should be consulted. In order for the managed care organisation to be certain about the quality and cost of care they provide, they employ their own staff. If the patient is to see an independent practitioner, then the clinical decisions need to be approved by a third party before they can be implemented and thus funded (Duckett 1997).

Despite aspirations of high quality and best practice care delivery, health care providers are exposed to a moral hazard. Often there is financial incentive to not provide all necessary care. For example, if the protocol for a patient included conducting a series of procedures, the organisation can "save" money by not providing all or part of that service. The organisation still receives the full funding for that episode of patient care, yet is not charged for that procedure. This phenomenon does exist, but it is a very short-sighted strategy (Scotton 1995). A patient not receiving the minimum standard of care will ultimately perform poorly, represent and potentially require a lengthier hospitalisation. Further weakness occurs if the managed care protocols are not evidence-based, current, and designed to achieve optimum health, rather than to minimise short run costs. Also, protocols without flexibility for particular individual patient circumstances can also lead to poor care. Alternatively, vague protocols may fail in their intent of limiting unnecessary outlays and ineffective care (Duckett 1996).

Interestingly, the introduction of the managed care legislation mandated outcomes research to study the efficiency, effectiveness and quality of health services. Flynn's (1991) comprehensive commentary on the impact of the introduction of managed care on the US health care system and the nursing

profession stated that this legislation had a major impact on hospitals, physicians and the way in which health care services were to be delivered. This is important for two reasons, firstly, as a result of hospital restructure, opportunities for new nursing roles, such as product line managers developed (Flynn 1991), which will discussed shortly. The role of the product line manager lead to the development of nurse case managers. Secondly, the mandating of outcomes research ensures that hospitals are accountable for the results of their services.

2.2.1 Australia and Managed Care

The Australian health system has historically performed relatively poorly in relation to key economic principles such as efficiency, equity and accountability. Peacock & Segal (2000) in their paper debating the imperatives and impediments of health care funding in Australia suggest that the primary cause of these shortcomings may lie in the complex set of funding and delivery arrangements at the State and Federal levels of government.

As a result of the recommendations of the NSW Health Council (2000), all NSW hospitals are required to fund the planned and acute activity component of a hospital's budget, such as the newborn care, surgical and elective procedures using episode funding based on the casemix model of funding. For more detail on acute episode descriptions see Table 1. Episode funding is a form of managed care. Funding is provided based on the price for each category of treatment. For episode funding to be successful, clinicians and individual hospitals must be involved in setting and monitoring standards of clinical

practice. The institutions must be accountable for outcome analysis, and introduce systems that lead to successful implementation of episode funding.

The gradual introduction of episode funding in NSW will enable managers and clinicians to analyse variations in the cost of an episode of care. For example, a hip replacement in one major Australian city hospital can cost up to 1.5 times more than in another hospital of similar size and function, with no discernible difference in quality of care or severity of condition (Menadue, 2000). This example can also be extended to trauma patients. For example, Sydney currently has one trauma centre in each area health service, with South East Health being the exception. South East Health supports three trauma centres within close proximity, and without needs and financial based justification, the Trauma Systems Advisory Committee of NSW (2000) have recommended the downgrading of two of these hospitals in relation to trauma.

Despite the many advantages that managed care offers, numerous authors advise caution. Woodward & Wilson (1994) who extensively investigated managed care in the British National Health System (NHS) and Duckett (1997) who is well qualified to comment on the issue of managed care in Australia, having an extensive background in health policy and research, have concluded that Australia should not rush to embrace managed care as a cure for health service ills despite its great appeal. Additionally, Pierce (2000) notes that health care is an institution that is very difficult to change and there is a great deal at stake.

Amos (2000), an extremely experienced health services consultant in his presentation at the Australian College of Health Service Executives 2000 congress, gave an insightful and comprehensive overview of the evolution of our health care system, both medically, politically and financially. He comments that casemix based reimbursement tends to ignore humanity and human feelings. Amos (2000 p62) adds in support of casemix, that despite this unfortunate characteristic it is the "best method of producing necessary economies in recalcitrant hospitals, and enables a system of benchmarking and comparison to be carried out, which could possibly lead to a better understanding of where economies should be effected".

On a more positive note, Bhojani (2000 p27), the commissioner of the Australian Competition and Consumer Commission (ACCC), states in relation to the introduction of managed care at the Trade Practices Issues in Health seminar in July 2000, that doctors really "shouldn't have any concern about loss of clinical independence". Under the National Health Act (1953) medical practitioners' clinical independence is guaranteed. In effect, this can be interpreted that the law in Australia states that health insurance funds cannot interfere with the clinical independence of medical practitioners. Bhojani (2000) presents a convincing argument regarding the issues of health insurance funds encouraging or giving preference to consumers who seek treatment from physicians who are part of the funds preferred provider scheme.

The Australian Medical Association is opposed to a list of preferred health care providers being available to the public, it is seen as the beginning of "managed scare" and compulsory conformity to managed care protocols the physician may

not approve of. Currently in Australia, predetermined practice guidelines are not used, and it is uncertain if Australia will completely adopt US style health funding. However Bhojani (2000) retorts that in its current form, this sharing of information does not breach the Trade Practices Act (1974). He adds that consumers are entitled to make an informed choice, particularly in regard to knowledge of charges and consumer protection. Also at the Trade Practices Issues in Health seminar in July 2000, Professor Fels (p25), the chairman of the Australian Competition and Consumer Commission (ACCC) confirms this by adding that the "heart of national competition policy is customers having the freedom to choose between products and suppliers". Professor Fels (2000) also states that if restrictions on competition were reduced, the supply of professionals would increase and services would be more widely available at a lower cost. It would also stimulate innovation, efficiency, and the creation of new methods of service delivery.

In light of these 'warnings' from numerous authors, it is important that we have academics, government officers and councils analysing the health care systems of other countries and identifying aspects that would not be relevant for Australia. This is particularly true for managed care. Duckett (1997) states that many principles have substantial appeal, but their implementation in Australia would require significant modification to take account of different practising patterns, policy ethos and policy structure. This should also include consideration of care delivery strategies such as nursing case management.

2.2.2 Trauma and Managed Care

Trauma Centres, or major trauma hospitals have grounds to be concerned about the impact of episode funding on their overall funding. In Australia, O'Connor (1994), of the Australian National Injury Surveillance Unit demonstrated that road injury admissions have the potential to be under-funded compared to other patients in the same diagnostic related group. O'Connor's study found that the average LOS and average AN-DRG cost of road injured patients is substantially higher than for non road injured patients overall. Limited information is provided on study methodology and data analysis, however O'Connor (1994) concludes that the implications for trauma hospitals in Australia is that they may find themselves disadvantaged because they receive a higher proportion of road injured patients. Research conducted in the US by Cayten et al (1991, cited in O'Connor, 1994 p77) concluded that "there is a consensus that the DRG prospective reimbursement system is inadequate to cover the hospital costs of injured patients, and that this is in part caused by prolonged length of stay".

DRG funding shortfalls in relation to trauma patients are compounded by the results of innovative research conducted at San Francisco General Hospital in the US by Campbell et al. in 1995. In an effort to determine the LOS and cost of trauma patient care. Campbell et al. (1995) examined billing records for 224 patients but failed in their goal to determine the cost of care for trauma patients. This was a result of inadequate detail and inflexible cost accounting measures. Campbell et al's (1995) research found that DRGs were not appropriate indicators for multi system injured trauma patients and did not adequately describe the trauma patient's episode of care. This is unfortunate because

Trauma Centres must have a precise knowledge of their costs if they are to survive in a managed care environment and negotiate contracts with managed care organisations

On a more positive note, patient education and preventive care are enhanced by managed care. This is particularly so for community based programs. Zerull (2000) reports that a group of hospitals in Virginia, US have focused on community based care for congestive heart failure patients. Their research indicates that having a nurse visit patients weekly, and providing education on symptoms, ensuring medication compliance and motivating the patient to aim toward better self care, they are significantly preventing readmissions (Zerull 2000).

Upholding the theme of averting hospital admission, managed care can contribute to a change in the focus of the health care in the form of injury prevention programs. As part of a series of papers discussing injury prevention and the role of managed care organizations (MCO), Moody-Williams et al. (2000) provide rationale and guidelines for MCOs to assist their members in remaining free from injury and in good health. Moody-Williams et al. (2000) state that paediatric injuries become an important issue for managed care organisations because of concerns for member safety and increasing medical cost relating to treatment. 1 in 5 American children receive medical care as a result of injury. Employers are affected because an injured child takes parents away from work and may diminish productivity when they return. Injury prevention decreases heath care consumption, and costs less than treating injuries, this provides incentive for MCOs to contribute to prevention programs

(Miller & Levy 1995). In the US, managed care organisations are now being advised by the Emergency Medical Services for Children Managed Care Task Force to designate to individuals the responsibility and the authority for injury prevention program development and implementation activities. They are also advised to integrate injury prevention into quality improvement activities, use data to solve injury prevention problems, promote parent and child education, create member safety incentives and work with the community to promote injury prevention activities (Moody-Williams et al, 2000).

2.3 Current Australian Hospital Funding Delivery Models

New South Wales has adopted episode-based funding, which is an aspect of managed care for provision of acute health services. The NSW government classifies patients into groups such as acute, palliative, rehabilitation and geriatric management. Trauma patients fit into the acute group, along with women in labour, and surgical and diagnostic procedures. By understanding funding delivery methods, the importance of accurate coding, and the potential role of nurse case managers is demonstrated.

Currently in NSW, episode funding is used for the acute and newborn portion of care. An acute episode of care is defined in Table 1 (NSW Health 2001b). The funding an institution is allocated for the acute inpatients funding period, for example 1 year, is based on activity projection of Australian Refined Diagnostic Related Groups (AR-DRG). AR-DRGs can be defined as a number of diagnosis-based classes that have been differentiated on the basis of clinical content and resource consumption. They enable the measurement of hospital output, and thus provide a basis for funding, budgeting and charging

(Commonwealth Department of Health and Aged Care 1998). The identification of any patient's AR-DRG commences with clinical coding.

Table 1: Descriptions of acute care episode patient criteria

Acute Care: the principle clinical intent is to:
manage labour (obstetric)
cure illness or provide definitive treatment of injury
perform surgery
relieve symptoms of injury or illness (excluding palliative care)
reduce the severity of illness or injury
perform diagnostic procedures, protect against exacerbation and /or
protect against exacerbation and/or complication of an illness and/or injury, which could threaten life or normal function.
NSW Health, 2001

2.3.1 Clinical Coding and Diagnostics Related Groups

The process of coding to determine a patient's primary AR-DRG is undertaken using International Classification of Disease codes called ICD-10-AM V2 (NCCH - National Centre for Classification in Health 2000). The coding process commences as a manual system. Once a patient is discharged from the hospital, the patient records are sent to the coding department. A coder will then read the notes and assign a numeric code for diagnosis or co-morbidities. For example, a fractured nose would receive the code S02.2. The code is then entered into a database. A patient may receive anywhere from 5 to 100 codes. This depends on how many procedures, diagnoses, co-morbidities,

complications and investigations the patient experienced in their hospital episode. Once all of the codes are entered, the computer program assigns a primary diagnosis and AR-DRG.

More formally, the study institution uses the 3M Coding and Grouping Software to perform the coding function. Manual coding requires a coder to match clinical statements in the patient record to diagnostic or procedural categories in multiple volume coding manuals. A coder using the 3M Coding Application is responsible for identifying the relevant information in the patient's record, but the software replaces searching for codes in a manual with computerised medical decision-making techniques. The program uses the same coding information the coder would use for manual coding, but can help ensure that terminology, rules and codes are applied consistently and that nothing is overlooked (3M Health Care 1998).

The process of grouping is also undertaken with the process of coding. The grouper software is specially designed to assign hospital episodes to Major Diagnostic Categories (MDCs) and provides precise DRG assignments using the Australian Refined AR-DRGs (Commonwealth Department of Health and Aged Care 1998). Once codes have been assigned for a patient's diagnoses and procedures, the grouping application uses those codes to compute the appropriate AR-DRG. The software contains all the current AR-DRG definitions, as well as the resource weight and recommended length of stay for each group.

The purpose of the ICD-10-AM is to permit the systematic recording, analysis, interpretation and comparison of morbidity data collected in different hospitals, states and countries. The ICD-10-AM system enables the translation of diagnoses and procedures and other health problems from words into an alphanumeric code, which permits easy storage, retrieval and analysis of the data. This version was introduced nationally on 1 July 2000, and at the study institution on the same date. ICD-10-AM V1 was originally introduced nationally on the 1 July 1998, replacing ICD-9-AM. The procedure codes are based on the Medicare Benefits Schedule (MBS) and are known as the MBS-Extended. Codes are revised in line with biannual updates to MBS (NCCH 2000). In a synopsis of the introduction of casemix funding systems in Australian hospitals, Roberts et al. (1998) state that the major advantages of ICD-10-AM for clinicians include the ability to update the classification within Australian with continued clinical consultation, procedure codes based on the Commonwealth Medical Benefits Schedule, and the possibility of having one classification for use in public and private hospitals.

It is well recognised that AR-DRGs are not appropriate for other patient service categories such as palliative care, rehabilitation, maintenance care and geriatric evaluation and management (Eager & Harvey 2001). Research conducted by Griffiths and Hindle (1999) support this statement. They found that the performance of AR-DRG's has been questioned with the respect to the classification of patients with chronic conditions, in particular diabetes. The AR-DRGs allocated to patients sampled in their review were neither clinically coherent nor obviously descriptive of resource use. However, according to the Commonwealth Dept of Health and Aged Care, the AR-DRG is a patient

classification scheme which provides a clinically meaningful way of relating the number and types of patients treated in a hospital to the resources required by the hospital. Emergency Department and Intensive Care Units are funded differently. In 2001/2002 shadow funding will be utilised (NSW Health 2001a). Shadow funding is adopted when the proposed new method of funding is in the early development phase and runs parallel with historical funding. Essentially, allocation of funding is completely dependent on clinical information coding accuracy for all these groups.

2.3.2 Issues associated with Clinical Coding Accuracy

Despite the importance of accurate clinical information coding to hospital funding, many issues regarding coding error and resultant cost remain, with few effective solutions trialed. Nursing case management as a solution is yet to be investigated in Australia, and this thesis demonstrates its great potential.

In 1991 Donoghue conducted a landmark large retrospective recoding study in Australia, with the aim of identifying specific errors and problems relating to medical record documentation and coding in 4000 records. Medical records were sampled from three large urban teaching hospitals as they provided an extensive range of clinical services and major specialty. It is assumed that the investigators did this to enable assessment of coding in a diverse range of medical fields, rather than risk the limitations a small sample of specialities would incur, and thus not provide a valid representation of Australian hospital admissions. Three qualified recoders were used in the study, one based at each hospital. Sources of coding errors were defined and tabulated. The study

reported a 60% aggregated error rate which decreased to 47% when minor errors were eliminated. Error rates reported in large studies conducted in the US are highly variable and range from 35% (Demlo & Campbell 1981, cited in Donoghue 1991) to 64.9% (Barnard & Esmond 1981, cited in Donoghue 1991).

Donoghue identified 8 sources of coding error in clinical coding, the most prevalent were:

- Inconsistent or unclear documentation, for example, illegible documentation or when the documentation is contradictory
- Missing codes, for example if a patient suffered a chest infection or other complication and the code was not included by the original coder.
- Incorrect additional code.

The error rate for DRG allocation in Donoghue's study was 9.2% which is considerably lower than large recoding studies from the United States which ranged from 18.6% (Hsia 1988) to 50.6% (Johnson & Appel 1984, cited in Donoghue 1991)

The most prevalent coding errors for incorrect DRG allocation include:

Ambiguous principal diagnosis, for example when there are two or more possible principal diagnoses.

- Clerical error, that is, human error in entering codes into the disease index.
- Coding rules not followed.
- Missing codes.

Donoghue concluded that poor quality documentation has a large impact on DRG assignment and financial implications, for example, from recoding 4000 records, the 3 hospitals involved did not identify $176,805 of potential funding. Similarly, Stevens et al (1998) reviewed coding in 7 Western Australian Hospitals in 1997 and found that coding errors accounted for a loss of nearly $400,000 per year per hospital. In contrast to the loss of funding experienced by Australian hospitals, in the United States Hsia et al (1988) sampled 239 hospitals and found that 61.7% of coding errors favoured the hospital, meaning that hospitals were receiving a higher net reimbursement than was supportable by the medical records.

The issue of poor documentation raised by most publications concerning coding error is particularly relevant for trauma patients, as their medical records are usually extremely lengthy and complicated. As mentioned by Donoghue (1991), a summary of patient care should be documented on a patient discharge summary. Hickie (1994) in his presentation on the challenge of casemix for clinicians at the 1994 Australian Casemix Conference confirms that the system succeeds or fails on the basis of the discharge summary. He adds that despite repeated entreaties from medical record departments and hospital administrators in conjunction with a variety of inducements or punishments, compliance with this requirement remains an ongoing issue today.

2.3.3 Potential Solutions for Coding Issues

In contrast to other Australian and international authors' negative experiences in addressing the clinical coding dilemma, at a large Australian children's hospital, Holman (1994) implemented a program to improve the quality of coding in terms of completeness, accuracy and timeliness. As part of the project implementation, the lack of understanding from medical officers at all levels was identified in relation to the process and importance of coding. Holman (1994) also states that there was a lack of planning to ensure all paperwork was completed by medical staff, and that facilities for documentation were poor. Intensive meetings amongst medical, nursing and medical records staff resulted in redesigning the discharge summary, the development of guidelines for completion of discharge summaries and a pocket size folder giving helpful reminders containing coding requirements. Holman succeeded in obtaining a 99% coding completion rate within 1 month of patient discharge. However, there is no presentation of coding accuracy results.

At a large metropolitan teaching hospital, Callen, McDonald and Sekel (1994) also attempted to rectify coding problems by testing the feasibility and accuracy of medical officer coding on the ward. Unfortunately the results were not encouraging. The medical officer coding error rate was 84% with an incorrect DRG allocation rate of 33%. There was also difficulty with compliance from the medical officers as a result of time constraints. However on a more optimistic note, the study improved communication and understanding between medical record administrators and clinicians in terms of understanding the coding process and its complexities. However this benefit would only be short term as

medical officers change institutions as often as every 6 to 12 months, so for this understanding to continue, the study, or education would have to be ongoing. This has not occurred.

At the 19th Conference for Health Information Management, Perry et al. (1998) described how in 1998 the National Centre for Classification in Health (NCCH) established a quality division in an effort to promote coding quality. They have introduced the Australian Coding benchmark audit and performance indicators for coding quality. However it remains apparent that there are many issues with clinical coding. As part of the discussion in a paper examining how continuous quality improvement can be used to enhance the quality of clinical documentation and coding, Callen et al. (1997) state that health information managers need to explore inventive ways of solving the problem of inadequate clinical documentation and high coding error rates. It is thought that the utilisation of the specialist nurse case manager may assist with clinical coding accuracy. Not only will nursing case management potentially improve coding, but more importantly, the quality of patient care. Prior to discussion on the role of the nurse case manager, it is advantageous to explore the development of the nursing case management model and its relationship to nursing theory.

2.4 Nursing Theories, Models and Case Management

2.4.1 Nursing Theories

A nursing theory offers a way of looking at the discipline in clear, explicit terms that can be communicated to others. It also provides direction and guidance for structuring nursing practice, education and research, differentiating the focus of nursing from other professions (Kozier et al. 2000). In terms of case

management, it is difficult to provide one nursing theory as a basis, yet despite a multitude of nursing theories, four major concepts are prevalent. These are:

1. The person who is the recipient of nursing care;
2. The internal and external environment of the patient;
3. Health/Illness or the patient's state of wellbeing;
4. Nursing, the discipline from which patient care interventions are provided (Kozier et. al, 2000).

These concepts are evident in Nightingale's original nursing concept (circa 1854). Nightingale's concept was holistic and focused on the environment, stressing the importance of fresh air, light, warmth, cleanliness and nutrition. She was adamant that nursing was not to be restricted to the administration of medicines (Schiavenatom 2001). Henderson in 1955 formulated a definition of the unique function of nursing which was a milestone in separating nursing as a discipline. She conceptualised the nurse's role as assisting individuals in a complementary or supplemental way (Kozier et al. 2000). In 1970 Roger's more complex "Science of Unitary Human Beings" theory viewed the person as a whole in continuous exchange with infinite environmental fields. King's theory of goal attainment has been described as offering hope for a practical approach to the case management model, in particular for developing approaches for effective and efficient use of resources (Tritsch 1998). King also uses communication to assist the patient to re-establish a positive adaptation to their environment, this is also an integral characteristic of the case management model.

Although it is difficult to attempt to provide a single nursing theory to provide the basis of the case management model. Orem's Self - Care Nursing Theory, which was introduced in 1959 is one of the more appropriate models to use in developing a role that focuses on patient outcomes. Orem's theory describes the role of the nurse in giving assistance to people who are unable to care for themselves. The goal is to meet the patients' self care needs until the family or individual is capable of providing care (Orem 1985). The identification of universal (physiological and psychosocial), developmental and health deviation needs recognised in Orem's theory will enable thorough planning and delivery of care to meet these needs. These needs are then assessed considering knowledge, skills, motivation and orientation.

In an article providing guidelines on using the Clinical Nurse Specialist to develop the case manager role Gaedeke, Norris & Hill (1991) advise that strategies based on Orem's conceptual framework decrease length of stay, relapse of illness and representation. They state that this occurs as a result of assessing the health needs of the patient and family and planning a course of care that will achieve outcomes in a cost effective manner, procuring required services, delivering needed care and monitoring achievements of goals. Orem's theory is a relevant theory on which to base case management. However, the concept of the family providing care is perhaps now less appropriate. After conducting research the problems of family care-giving among discharged patients Chen, Lin & Dai (1999) proposed that in our current society, many patients do not have family members, or family members lack the knowledge, ability or willingness to provide care for their relatives. Although perhaps the universal needs component of Orem's theory would identify this

deficiency, as one of the eight universal self-care requisites is the prevention of hazards to human life, human functioning and human well-being (Orem 1980). In the context of a trauma patient with physical impairment requiring ongoing assistance following rehabilitation, an essential aspect of the case managers role in assisting the patient fulfil the above requirement for self-care could be arranging the following; community nursing support to assist with hygiene, meals on wheels, and a home assessment by an occupational therapist to remove hazards and arrange necessary equipment to support human functioning, for example, a shower chair and handrail.

In discussing the sociological concept of status-role in nursing, Orem (1980 p9) explains that the extent of a nurse's domain varies with the patient's capability for self-care because of their health state. In applying this domain to the case management role it is evident that the case manager assesses each patient as an individual and must ascertain the level of intervention required. The intensity of the nurse-patient relationship reflects the meaning that nurse and patient attach to their role relations (Orem 1980). The case manager must carefully consider this aspect of Orem's concept, as the case management model is new to Australian institutions, unfamiliar to the patient and separate from the traditional "primary carer" nurse role. The case management role must be carefully explained as the case manager does not wear a uniform, and will not be present on the ward at all times, this may confuse the patient and their family. It is also important to explain the role to the bedside nursing staff.

The relationship between nurse and patient is complementary and requires the development of a cooperative working relationship. The case manager will be aware of the patient care plan, and able to liaise with specialty medical teams and allied health services when required. They are often relied upon to provide information about the patient care plan and explanation of the same to family and nursing staff.

Orem (1980 p19) states, "nursing practice not only has technological aspects but also moral aspects, since nursing decisions affect the lives, the health, and the welfare of human beings". This is relevant to the case management model as the case manager must be an expert in all aspects of their field of management. In the case of this study the case manager must have an excellent understanding of the complex needs of the trauma patient, from the resuscitation phase through to the rehabilitation phase. In addition, they must act as a patient advocate, questioning if the current mode of treatment is the most appropriate for that patient, and that the patient and their family are aware of and content with the plan of management.

2.4.2 Task-Oriented and Holistic Nursing Models

A model of care can be defined as an overall view of theories used as a guideline to put the theory into practice (Kozier et al. 2000). Nursing models have a focus on the total health needs of the patient and also consider preventive health promotion (Queensland Nurses Union <06.11.2001>). Task oriented and holistic nursing models have been the most predominantly used and reported.

The task-oriented model of nursing care is described by Reilly & Perrin (1999) as being introduced by Florence Nightingale. In a commentary paper on the preparation of the Australian nursing profession, Reilly & Perrin (1999) question if current nursing education programs are educating to lead or training to be manageable. In asking this question Reilly & Perrin (1999) conduct a comprehensive review of historical nursing literature and state that despite Florence Nightingale representing a vision of nurses as educated, reflective practitioners, this was not what eventuated. They add that as a result of the prevailing male-dominated medical establishment and societal views of women at the time, the implementation of Nightingale's theories were constrained and restricted. It could be argued that because of these social and political issues of the nineteenth century, Nightingale moved from being a visionary, transformational leader to a managerial or 'situational leader'. She became a bureaucratic-managerial leader with the responsibility of ensuring nursing tasks were achieved in a way that met her reforms but in a manner that more importantly, met the needs of medicine and the health care organisational structure, rather than her original vision of holistic, educated, reflective practitioners

Reilly & Perrin (1999) add that there was little change to nursing training requirements in Australia from the turn of the century to the nineteen sixties and seventies despite changes in general education, women's roles in society and in medicine and technology during this time. The main method of learning for nurses remained task oriented in a 'learning by doing' clinical situation, and Bradshaw (1995), in a review of nursing theories adds that the main emphasis

of care provision was placed firmly on the physical and biomedical tasks. This orientation entrenched the 'medical model' as the curriculum makers and nurses were taught to carry out the decisions taken by the doctors. Task orientation, whilst being concerned with the practicalities of the patients' physical function, may have improved comfort, but its task dominance undermines personal relationships, personal preferences and emotions. Changes in nurse education were slow to make an impact, and adjustments were only introduced as technology and the accompanying changing tasks required (Reilly & Perrin 1999).

Task orientation models of nursing work against comprehensive team-based holistic care, which is more applicable to the case management model, that is largely based on collaboration and effective communication. Holistic nursing care implies that the nurse considers all aspects of the person, addresses the person as a whole rather than as individual body systems, and includes the family when planning care (Lobo cited in Phipps et al. 1991). Nursing theorists who consider nursing from a holistic perspective include Orem, Peplau, Rogers, King, Roy and Watson (Lobo 1991) cited in Phipps et al. 1991).

An example of the difference between task-oriented and holistic nursing could be as follows. A trauma patient with a history of alcohol abuse was admitted following a car crash. He was suffering from a fractured jaw, a lumbar spine fracture, and fractured ribs. It was later made known that the patient had taken an overdose of an anti depressant medication in conjunction with alcohol and drove himself into the tree. Task oriented doctors and nurses may only consider one aspect of the body at a time, as occurred in this case, the lumbar spine

fracture. The medical team documented to ensure that the patient remained lying flat to prevent any spinal cord injury from the fractured lumbar spine vertebra, and had minimal, inappropriate analgesia prescribed. It was not considered or documented that the patient required adequate analgesia and chest physiotherapy for his rib fractures in order to aid effective coughing and prevent development of a chest infection. The patient was on bed rest, so he needed medication to prevent development of a blood clot in lower limbs (thrombosis), a diet of thickened fluids should have been ordered as the patient was unable to chew. The patient's attempt at suicide must be addressed with a psychiatric review and his potential for alcohol withdrawal should be considered and reviewed by a specialist team In addition, other aspects of patient care that need to be considered are the psychological impact of injury on the patient and the family and the planning, implementation, and evaluation of nursing care for this patient

It is highlighted by the above case that task specific care can allow deficits to arise in many other aspects of patient care. To summarise holistic care, Benner (1984) states that the patient's concerns, behaviours and physiologic data should be integrated with the nurse's scientific knowledge base and experience. The impact of the nurse on the concepts of environment, family should also be considered. King (1981 p4) also summarises holistic care in a manner pertinent to case management stating that "nursing is perceiving, thinking, relating, judging, acting, interacting, and transacting with individuals who come to a nursing situation"

The Case Management Model pioneered by Zander in 1988 will be discussed shortly and is based on the concept of holistic care, not only from nurses but the health care team. The nurse is the key coordinator. The existence of this key role for nurses supports the argument by The Canadian Nurses Association (CNA) (1993) in their position paper on the scope of nursing practice, and review of issues and trends in nursing. The CNA stated that nursing initiatives underway are setting a direction that recognises the need for flexibility in the face of change, as well as the importance of cooperation and collaboration among health disciplines. It seems clear that the new directions in the health care system will provide significant opportunities for nursing. Many nursing jobs will be different, but nursing will continue to be a crucial part of the health care system.

The literature also supports the approach that the nursing scope of practice will never be possible to define precisely and in great detail. In a US paper on the clinical advancement model, and review of nursing theory, Sona (1993) adds that no one nursing care model can meet all needs. In a UK discussion paper on nursing roles, Moores (1992) adds that the lack of a definitive nursing care model is partly because health care and nursing are changing so rapidly. She states that descriptions become outdated almost before they are completed, and partly because the nursing field has become far too complex to be reduced to lists of tasks and procedures.

2.5 The Development of Nursing Case Management

With the introduction of managed care in the US the entire health care industry was challenged to "reinvent itself" (Olivas et al. 1989). With the resultant changes, a health system which focused on cost required care delivery strategies which were cost effective and positively affected patient, caregiver and system outcomes. In an attempt to deliver these objectives, strategies such as product line management followed by case management were introduced.

2.5.1 Product Line Management

Product line management was an early model of care delivery introduced in an effort to have better control of costs and to compete effectively in the changing health care system. It has been used in business for over 80 years as a management strategy to control costs (Flynn 1991). In a paper exploring the concept of product line management in the US Pierog (1991) describes it's benefits as increased efficiency, reductions in the duplication of services, optimal use of resources, revenue enhancement and accelerated decision making. Product line management reduces the organisation structure with the rationale that the hospital is a business enterprise. By reducing the structure, it was assumed that the authority for decision making was decentralised and decisions could be made by those closest to the product or health service provision. The person who is considered to have the most knowledge about the product is the product line manager. Sovie (1987), in a paper on the impact of executive leadership on nursing commented that one of the main concerns with product line management was that nurses were not being selected as the product line manager. How could a product line manager without any clinical

knowledge manage the cost and quality of a person's health care?

This focus on cost and productivity created conflict for the nursing profession, which was more concerned with the quality of patient care. The business orientation created by product line management was seen as detracting from the human caring aspects of nursing. It is little wonder with the use of terms including "product", "customer", or "market place". Flynn's (1991) commentary of the impact of the introduction of managed care on the nursing profession reported that some nurses objected to this change in care delivery purely on an ideological basis, without really understanding the significance for health care. Yet on a more informed note, Flynn (1991) added that quality care can still be delivered despite economic changes, it requires collaboration between professions and trials and evaluation of different models of care.

2.5.2 Nursing Case Management

The nursing case management model was pioneered at the New England Medical Centre in Boston in 1987 by Zander & Etheridge (1989). The model was developed as nurses, nurse managers and administrators questioned their practice in relation to increased acuity, shortened length of stay and the many issues of concern that product line management raised to the nursing profession (Zander 1988). Zander's nursing case management model differs from product line management in the following respects:

1. The "product line" is managed, organised and coordinated by the actual caregivers who are accountable clinically and financially for each patient's outcomes over the entire episode of illness.

2. It is built on case-type specific protocols, outcomes and resources framed by reimbursement-allotted length of stay.
3. Quality is prescribed in written detail, managed concurrently, and evaluated collaboratively.
4. The patient and family are actively engaged as members of the multidisciplinary, collaborative, health care team (Zander, 1988).

In Zander's (1988) ground-breaking paper describing the nursing case management model, and the strategic management of cost and quality outcomes, she states the model developed as nurses, nurse managers and administrators questioned their practice in relation to increased acuity, shortened length of stay and the many issues of concern that product line management raised to the nursing profession. The case management model of patient care delivery is comprehensively described by Girard (1994) as a system of health assessment, planning service procurement, delivery, coordination and monitoring to efficiently meet the needs of clients. In their descriptive paper on the use of the case management model in Canada, Petryshen & Petryshen (1992) add that economic reform, changing roles for health care personnel, health care reform and patient demand for higher quality care contributed to the development of case management, and that it's use has become prominent throughout Canada.

The case management model is used for selected patients or populations, because not every patient needs intensive staff care. Complex, high cost groups that require multiple procedures, interventions and resources benefit most from case management. This is supported by Allred et al. (1995) who in a

large teaching hospital in the US conducted extensive research into the effectiveness of nursing case management in varying acute care settings by examining patient care outcomes, such as length of stay, the incidence of in-hospital complications such as urinary tract infections and patient satisfaction. The investigation conducted by Allred et al. (1995) into case management is very extensive and exploratory and investigates in depth the relationships between different levels of outcomes and practice environments

The authors stated that in order to determine the effectiveness of nurse case management, the nursing practice environment in which nurse case management was being instigated needed to be clarified. The nursing practice environment was grouped into levels of uncertainty (low, moderate and high), to determine if nurse case management was more effective in any one group. To establish the levels of uncertainty, a questionnaire was used to measure the degree of complexity, change, unpredictability and uncertainty associated with the information, resources or relationship factors identified as most important to patient care. The population studied to determine the practice environment were randomly chosen and adequately represented the nursing population within the institution.

The designs used included questionnaires called the Perceived Environmental Uncertainty Questionnaire and The Case Management Patient Satisfaction Survey, although the questionnaires were not described in any detail, which made it difficult for the reader to understand how the feelings of uncertainty were described by nursing staff. The data collected for patient outcomes included a group of inpatients over a one year period, however there is no

definition of the population, and it is uncertain if the patient population length of stay data collection was retrospective or randomised.

Allred et al. (1995) found that nursing case management is more cost effective in a nursing practice environment of moderate uncertainty, such as with a complex patient. This equates to a working environment which necessitates nursing staff requiring more sophisticated knowledge and organisational skills. In addition, when caring for a complex patient, nurses require more information from and communication with treating medical teams. The nurse case manager was able to provide this assistance and intervene as required.

Allred et al. (1995) have investigated extremely important and useful issues. They are very relevant to today's nursing practice and have provided a reliable and valid reference for future research into nurse case management. The nurse case management role has been shown to be standardised in previous research, thus the demonstrated cost effectiveness of nurse case management in the investigating institution may be considered transferable to other institutions with similar characteristics.

In an article describing the assessment process undertaken to determine the scope and cost of care management (which is another term for case management) for complex patient groups, Clapp (2000) states that care management should be the focal point of the organisation if they are to succeed in a managed care environment. Clapp adds that this is because care management is a complex process consisting of an array of medical, nursing and care coordination activities, both clinical and non clinical. Clapp (2000)

presents a case for an organization-wide care management process, stating that factors such as accountability for coordination, overuse of registered nurses for non professional tasks, a lack of data, inflexible tools, and integrating clinical and non clinical components all require acknowledgment. An organisational care management system encompasses (a) referral management, (b) patient triage and placement, (c) initial assessment, (d) development of care plans, (e) provision and coordination of care, (f) monitoring and evaluating outcomes and (g) communication and education. This system is very patient-focussed, and can bind organisations together.

Clapp (2000) also adds that, organisations have not fully embraced the challenge of making care management the pivotal point for organisational structure and resource allocation. Nurses expert in the use of the nursing process are key to supporting the care management process organisation wide.

2.5.2.1 Nurses as Case Managers

In discussing the role of nurses in the managed care environment, Flynn (1991) states that nurses are ideal as case managers because of their clinical knowledge, experience in coordinating patient care and experience in collaborating with other disciplines. The ability to work with other individuals in the hospital setting on a continuous basis is essential to the success of a case manager. Lochman (1983), whilst commenting on factors related to a patient's satisfaction with their medical care adds that case managers consult with a myriad of health care providers to obtain information about potential problems. He states that they collaborate with many of the same individuals to develop strategies to solve these problems and evaluate progress and outcomes, which

in turn improves patient satisfaction. Brockopp et al. (1992) in their description of the University of Kentucky model of case management, which highlights fiscal and clinical evaluation of patient care support the concept of continuity of care stating that case managers also develop therapeutic relationships with their patients and families. Millar et al. (1996) in their paper discuss the importance of gaining consensus regarding the nursing outcomes for the patient by patient, nurse and other health professionals. Millar et al. (1996) add that consultation with patients and families enables case managers to work towards mutually acceptable outcomes, and increase patient satisfaction. In addition, Adams, Bond & Hale (1998) as a result of a United Kingdom Department of Health investigation into the organisation of work practice found that collaboration with medical staff and other health care professionals increases nurses' ease of working and ability to cope with a variable workload. Trauma Case Management has a large collaborative component and would thus, in light of Adams, Bond & Hale's (1995) comment aid nursing practice.

2.5.3 Clinical Pathways

Within the case management model, care maps or clinical pathways can be used. In a commentary on the issues associated with the use of clinical pathways in Australia, Gibb & Banfield (1996) state that pathways are developed to reduce practice variation and patient length of stay, improve management resources, and increase cost effectiveness (See Table 2). Pathways can achieve these outcomes as they are an organisational tool used to organise and sequence key events on a predetermined timeline. Clinical pathways are in effect a list of tasks the nurse must perform for the patient,

such as 4th hourly blood pressure. In addition, the clinical pathway contains a list of goals the patient is to have attained by a certain time period. For example, a patient with a fractured femur should have received deep vein thrombosis prophylaxis within 2 hours of admission, and have been referred to the physiotherapy department within 4 hours. Also, the patient should have undergone operative fracture fixation within 12 hours. If the patient did not achieve a particular goal, the nurse has to document the cause of goal failure. This failure to achieve a goal within the stated time frame is called variance.

Table 2: A summary of the definition and purpose of clinical pathways

Clinical Pathways
1. An organisational strategy or tool used to organise and sequence key events on a predetermined timeline.
2. Designed to decrease practice variation if followed as developed.
3. An outline of necessary interventions which must occur, within specific time frames, during the patient's hospital stay – consultations, diagnostic tests, discharge planning, patient education, and anticipated length of stay.

Adapted from Emergency Nurses Association, 1999.

Variance, more formally defined, is the difference that arises between the interventions on the clinical pathway and the real status of the patient, and is inevitable. The Emergency Nurses Association (ENA)(1999) of the United States advise that identifying variance in the categories listed in Table 3 can help pinpoint problems in care. Variance analysis is an integral part of case management programs utilising clinical paths. By identifying problems or positive variance, practice can be altered, improved or maintained accordingly. By providing evidence relevant to specific issues, variance analysis facilitates implementation of change of practice. Analysing variance from pathways assists in the managed care goal of increasing accountability, quality assurance and best practice implementation.

Clinical pathways are specifically designed for groups of patients with the same diagnosis. Campbell & Hill (1996) in their case for wide use of clinical pathways argue that care is so complex and variable from patient to patient, that if the essential components are not "blueprinted" they are either forgotten or not done on time. As a result patient outcomes are jeopardised. This statement is potentially true, if nursing education standards declined or if experienced nursing staff were unavailable and nursing case managers did not have a presence in the health care setting.

Table 3: Categories of variance that aid in pinpointing problems in patient care.

Variance Classifications
• Patient caused variance: the patient was in too much pain and unable to receive physiotherapy as planned.
• Family caused variance: family arriving to pick up the patient several hours after the arranged discharge time.
• Clinician caused variance: orders not implemented by the appropriate care giver, what ever the reason.
• System caused variance: CT scan delayed due to equipment failure.
Adapted from Emergency Nurses Association, 1999.

The increase in the use of clinical pathways in Australia appears to be directly related to the increased focus on health care expenditure through various forms of casemix funding. Scott (1997) confirms that recognition is increasing of the role that pathways play in predicting resource use and costs, evaluation through variance analysis, as well as reducing re-admissions and the average LOS.

In order to implement a critical pathway, the case manager, in conjunction with nurse educators or nurse unit managers would need to supervise the documentation and completion of critical paths for a specified time. A database for variance from the clinical path would need to be developed in order to determine effectiveness and problem areas. Variance analysis is an integral part of case management. Data should be collected daily to prompt corrective action when necessary. It is important to note the "what", "when", "why",

"where" and "how" of each episode (ENA, 1999). By identifying problems or positive variance, practice can be altered, improved or maintained accordingly. These findings provide powerful data for utilisation to improve patient care.

Barriers may occur whilst trying to implement a clinical pathway. Gibb & Banfield (1996) state that without nursing acceptance, resistance to and non-compliance with the pathway will most likely occur. Incorporating the pathway itself into existing nursing documentation aids in promoting its use. If the pathway is a separate document, it risks being perceived as a duplicity of work, leading to non compliance in clinical pathway documentation. The pathway concept must also be supported and have general consensus from the treating doctors.

2.5.4 Trauma Clinical Pathways

Multi-system injured trauma patients can have a myriad of injuries, and it is rare that any two patients suffer the same combination of injuries. It can be said that clinical paths are not a viable option for the multi-system injured trauma patient. Having said this several Trauma Centres have attempted to implement critical pathways for trauma patients. In the US, Misinki et al. (1993) in their paper discussing the benefits of a model for trauma outcomes management in patients with multiple trauma acknowledged that all aspects of trauma patient care must be coordinated and communicated to maximise patient outcomes. They devised a critical path for the first few hours of the trauma patient's arrival in the ED, which then proceeds to be a multi-system critical path focusing on body systems, for example, airway, breathing and circulation. The aim of this

model of care delivery was consistency. Whilst discussing that their patient outcome guide has many benefits including decreased cost, quality improvement, ease of data collection and improved patient outcomes, Misinki et al. (1993) do not provide any results to validate their comments.

At the 1995 American Trauma Society Annual Meeting, Cowell (1995) reported that the Grant Medical Centre in Ohio developed a body systems pathway. Following implementation, trauma patient LOS was decreased by an average of 0.81 days, it is unknown whether this result was of statistical significance, or of any real financial benefit. Cowell (1995) also reports that Hartford Hospital in Connecticut instituted a trauma 24-hours Observation Critical Path for patients who did not initially exhibit severe injuries, but had sustained a period of unconsciousness due to a closed head injury, a significant mechanism of trauma, or the use of alcohol or drugs. They eliminated unnecessary admissions for variable periods of time depending on practitioner preference. Although little analysis is provided regarding the decreased admission rate. Also in the US, Spain et al. (1998) analysed the effect of a clinical pathway for severe traumatic brain injury and demonstrated significant decreases in resource utilisation. However, the effectiveness of pathway implementation would be dependent on the standard of care and level of coordination prior to its introduction.

In Australia, Sesperez et al. in 2001) conducted a prospective evaluation of the effect of clinical pathways on selected patient outcomes and groups. They demonstrated that clinical pathways can improve patient outcomes in areas such as pain management, skin integrity and physiotherapy use. However

despite stating that TCM was effective in achieving these outcomes, there was no description of TCM techniques, other than the enforcement of clinical pathway use and variance documentation. Sesperez (personal communication, 2000) revealed that the desired impact was to ensure that ward nursing staff adhered to the pathways, however this was not always the case. The trauma case manager was largely responsible for the enforcement of the clinical pathways and for documentation of, completion of, and variance from the pathway.

2.6 Trauma Case Management

TCM has been practiced in the US since the early 1990's. Unfortunately, the US has remained the only health care system to have formally embraced TCM. In a UK discussion paper on nursing organisation in the acute care setting, Adams & Bond (1995) state that functional, team and primary nursing remain dominant in nursing, even though newer systems such as case management are beginning to emerge (cited in Adams, Bond, & Hale 1998). This is confirmed by Burns et al. (1999) who conducted a randomised trial investigating the best model of case management for severe psychotic illness, reported that case management is now well entrenched in mental health and community nursing in the UK. Waterman, Waters, & Awenat (1996) in their paper relaying their experiences with introduction of case management on a rehabilitation ward confirmed that this is also the case in Australia. The Case Management Society of Australia (2001) state that case management is now widely embraced across diverse settings in the human services and health sectors. However, the nursing case management model has yet to be adopted in trauma care or be explained

in both UK and Australian literature. It is significant that case management has been recognised as an effective model of care for mental health and community patients, as they possess similar characteristics to trauma patients. Each of these patient groups is complex, requiring multidisciplinary care and extensive planning of care.

The majority of TCM literature arises out of the US, where it has been practiced in various forms for over a decade. At a large US trauma centre in 1990, Spisso et al. investigated the role of the trauma nurse practitioner. They claimed a decrease in LOS of 13% for trauma inpatients with greatly improved documentation in the medical record by conducting cost-benefit analysis and reviewing data on LOS. However there was no analysis performed regarding the significance of their result. Also, in the US, in a case presentation article Fernandez in 1995 provided a descriptive account of Trauma Case Management, concentrating on the role of TCM in the care of multiply injured patients, and reiterating the role of coordinator, facilitator and educator. Harrahill & Eastes in 1999 published the responsibilities and duties performed by the 'trauma nurse practitioner' at their major us trauma centre and acknowledge that they have struggled to find useful performance indicators to measure their effectiveness. As previously discussed, a number of authors have investigated the impact of trauma clinical pathways. However there is minimal significant evidence to demonstrate the effectiveness and contribution of the Trauma Case Manager to patient care and trauma patient outcomes.

2.7 Trauma

2.7.1 The Problem of Trauma

The Institute for International Health's (<06.11.2001>) Injury Prevention and Trauma Care Unit state that by 2020, injuries are expected to account for 20% of deaths worldwide (rising from 15% in 1990), of which motor vehicle related injuries will represent a substantial portion. By 2020, they are expected to be the third leading cause of death in previously healthy people. The burden of disability caused by these injuries will grow particularly in low income and newly industrialised regions of the world.

On a more local level, injuries are a significant source of preventable illness, disability and mortality in Australia, and place a heavy burden on health services. Over the past decade, injuries, poisonings and violence, including suicides (referred to as external causes) accounted for more than 7,000 deaths per year. National hospital statistics for 1998-99 show external causes to be the second leading cause of hospital separations (Australian Bureau of Statistics (1998) <06.11.2001>).

The Australian Bureau of Statistics (1996) also reports that between 1983 and 1993 the number of people who died due to a motor vehicle crash decreased by 31%. It can be suggested that with improved medical technology and trauma management, people who would have previously died as a result of their injuries now have improved chance of survival. This equates to an increased number of survivors and thus hospital admissions. People who are killed or injured in road crashes are most likely to be drivers aged between 15-29,

followed by passengers, pedestrians, motorcyclists and pedal cyclists. Interestingly, 29% of drivers killed had a blood alcohol level of 0.05 or more.

In Victoria and NSW, injury is the leading cause of death in people aged 1 to 44 years. During childhood, injury accounts for approximately 50% of deaths. In adolescents and young adults, it accounts for 75% of deaths. Trauma deaths are only a small proportion of the total trauma cohort. Recognition of the number of deaths from trauma does not account for the full scale of the problem. In Victoria, for every death from injury there are 31 hospital admissions and 144 emergency department visits (Acute Health Division 1999).

The cost of treatment of trauma is significant. For example, in Victoria, for the financial year 1991 - 92, the inpatient hospital costs in Victoria attributable to injury were $145.9 million. This represents just over 10 per cent of total inpatient costs to the State (Acute Health Division 1999). This cost does not include the total costs to the individual and the community that result from trauma. It also does not include economic costs to the State, such as costs from legal expenses, rehabilitation, emergency services and associated insurance costs. National Hospital Statistics for 1998-99 show external causes of injuries are the second leading cause of hospital admissions (Australian Bureau of Statistics 1998)

MacKenzie & Fowler (2000) discuss the epidemiology of trauma in "Trauma" edited by Mattox et al. (2000), which in the trauma arena is considered one of the most comprehensive trauma texts in circulation. MacKenzie & Fowler (2000) state that many nonfatal injuries have far-reaching consequences in terms of

reduced quality of life and high costs accrued to the health system, employers and society in general. These costs include direct expenditure for health care and other goods purchased as a result of the injury and the value of lost productivity due to temporary and permanent disability. These costs to society do not take into consideration the pain, suffering and reduced quality of life often associated with nonfatal injury

2.7.2 Trauma Patient Characteristics

The care of trauma patients requires the utilisation of extensive hospital resources. The care of these patients involves high costs. In Fernandez's (1995) discussion of characteristics of the multiply injured patient he states that they require critical care management and intensive nursing care, undergo multiple surgical procedures and interventions, and their length of stay is often extended. These characteristics have been summarised clearly by Misinki et al. (1993). An outline of her findings is presented in Table 4. The plans of care for these patients can be fragmented as a result of the involvement of multiple caregivers, and an unpredictable hospital course (Spisso et al.1990). This leads to difficulties in coordinating the care of the trauma patient between the different treating services, and is one of the reasons Spisso et al. (1990) introduced the trauma nurse practitioner to their US trauma insitution.

This population lends itself quite well to case management as trauma patients traditionally have unpredictable injury patterns, premorbid/comorbid conditions (Miller & Levy 1995) and ineffective communication between disciplines and physician teams (Spain et al. 1998). In an article describing the assessment process undertaken to determine the scope of care management for complex

patient groups, Clapp (2000) adds that a patient with a complex illness commonly received the services of ten different people. The same could be said for any multi-body system injured trauma patient. Several factors contribute to the level of complexity and cost of clinical management. These include, severity of illness, chronicity of diagnosis, high risk of variable outcomes, multiple diagnoses, lack of definitive diagnosis, and multiple body systems involved (Clapp 2000).

Additionally, potentially high risk factors such as substance abuse, cultural barriers, low income, geographical barriers and mental illness add to the complexity and thus cost of patient care. This is particularly true for trauma patients. Large proportions of trauma presentations involve the use of alcohol and other drugs. Geographical barriers to discharge occur as a result of a transient city population and the fact that many trauma patients are retrieved to the trauma centre from rural regions. Barriers include transport to the patient's home, the availability of specialist rehabilitation, such as physiotherapy and occupational therapy and the availability of specialised equipment, such as shower bars and frames for patients in smaller metropolitan and rural regions. Psychosocial factors and their resultant impact on care coordination complexity, tend to be more hidden, less predictable and thus easily unrecognised as an additional significant driver of the cost of providing care (Clapp2000).

Table 4: Unique features of patients with trauma

Patients with Isolated Injury	Patients with Multiple Injuries
• One injury • Designated AR-DRG and LOS • Fixed reimbursement • More predictable clinical course • Surgical procedures easier to map than medical diagnoses • High volume, low cost, low risk	• Two or more systems injured • Multiple physiologic and psychologic complications. • Difficult to track by AR-DRG • Varying LOS, difficult to establish a baseline • Longer LOS than patients with isolated injury • Multiple medical specialty consults • Multiple discharge planning needs • Long term rehabilitation services required • Involvement of almost all allied health services • Multiple patient care units provide care throughout the trauma continuum • Likely to have a stay in a critical care unit • Difficult to map due to injuries and complications • Low volume, high cost and high risk

Adapted from Misinki et al (1993)

2.7.3 Trauma at the Study Institution

The Hospital where this study was conducted is a major trauma service/tertiary referral centre as defined in the NSW State Trauma Plan (1994). It currently admits nearly 200 severely injured trauma patients, and over 2500 injured patients per year. The number of trauma admissions at the hospital has increased by 4% since 1998. According to the trauma service database, the mean length of stay of the trauma patient has increased by 1 day since 1998 (Grove, Curtis, & Garnam 2001).

The Department of Trauma at the study institution has the responsibility of overseeing the assessment and management of all trauma patients presenting to the hospital. The department also undertakes analysis of the presentations utilising a comprehensive purpose designed trauma database. The collection of trauma data is essential in providing statistical information required for policy decision making and ultimately providing for better patient care. The application is written in Visual Basic and utilises the Microsoft Jet Database Engine. The application is the most widely used Trauma data collection software in NSW. A direct connection/communication feature to the data entry module queries the HOSPAS system for demographic data and ICD 10 codes for each MRN entered, and an import feature imports data from the Emergency Department Information System (EDIS). An Abbreviated Injury Scale (AIS) Code lookup feature to the data entry module that allows automatic addition of the relevant AIS code for each injury recorded. This aids with providing information for clinical coding of trauma patients. The database contains data on the patient's

mechanism of injury, pre-hospital treatment received, management at the treating hospital, any operations performed or the development of in-hospital complications. In addition the database records the LOS, ventilator days, injuries and probability of survival.

During the trial, there were 1.5 full time equivalent FTE) clinical nurse specialists, 0.5 FTE secretary and medical coverage through the Emergency Department. The trauma service is dedicated to the ongoing review and improvement of trauma care at a local and national level. The Trauma service also has a major commitment to injury prevention, education, research and trauma care delivery model development.

The current model of trauma care delivery involves a "tiered" trauma team activation for the hospital. The trauma team is activated on trauma triage criteria, which are the same as trauma data base entry criteria. These require the patient to possess one characteristic from three possible fields. The fields are "mechanism of injury", for example a motor vehicle collision at speed > 60 kph, "vital signs", for example decreased level of consciousness or "injuries", for example an injury to two or more body regions. Once a patient has arrived at the study institution, whether by ambulance, helicopter, police escort or private motor vehicle, they are assessed using the following methods.

2.7.4 Trauma Patient Assessment

The primary survey is a rapid assessment, performed immediately on trauma patient arrival to the Emergency Department. Its purpose is to simultaneously identify and intervene in treatable life threatening injuries. This universally accepted assessment is known as the "ABCs". The primary survey prioritises evaluation and intervention in airway function and immobilising the cervical spine. For example, it must be ensured that the airway is patent, free from obstruction or impending obstruction.

Bell & Krantz (2000) in their discussion of the initial assessment of the trauma patient in Mattox et al's (2000) "Trauma" text state that once the patient's airway is deemed secure, the patient's breathing is assessed. This consists of listening to the patient's chest to determine if both lungs are inflated and functioning and without major life threatening injury, such as a massive hemothorax. Circulation, meaning the patient's blood circulation is assessed using the patient's heart rate, blood pressure and peripheral perfusion. Disability (or neurologic status) is assessed by determining the patient's level of consciousness, pupillary reaction and ability to move all four limbs. This assessment process occurs simultaneously with the removal of the patient's clothing. The clothes are removed to enable to full assessment of the patient.

The secondary survey is a complete head to toe examination. It begins after completing the primary survey and ensuring that appropriate resuscitation is in progress. Esposito (1998) in her discussion on nursing assessment and

resuscitation of the trauma patient states that it is important to regularly repeat the primary survey in an attempt to identify any deterioration or development of new symptoms.

The tertiary survey is a standardised clinical re-assessment of the trauma patient within 24 hours of admissions, it also involves the review of all investigations that have already been conducted. In Australia, Janjua, Sugrue, & Deane (1998) demonstrated the importance of the tertiary survey in a prospective evaluation of early missed injuries and the role of the tertiary trauma survey. Of 206 patients, 134 patients (65%) had 309 missed injuries . The tertiary trauma survey detected 56% of early missed injuries and 90% of clinically significant missed injuries within 24 hours. Clinically significant missed injuries occurred in 30 patients with complications in 11 patients and death in two patients. It is interesting to note that errors arise in a variety of areas. Of 224 contributing errors, 123 errors were in clinical assessment, 83 errors were in radiology, 14 errors were patient related, and four errors were technical. The missed injury rate was significantly higher in patients with multiple injuries and in those involved in road crashes. Janjua et al. (1998) concluded that the secondary trauma survey is not a definitive assessment and should be supplemented by the tertiary trauma survey.

If a trauma patient requires admission they are allocated to the Trauma Surgeon on call, and any specialty medical team as required, for example, orthopaedic or neurosurgery. The patient is admitted to a ward as soon as a bed becomes available. The trauma team then transfers the care of the trauma patient to the subspecialty team following the tertiary survey, if further general

surgical intervention is not required. This is usually within 24 hours.

If multiple body systems and thus multiple medical teams are involved, there is no dedicated team overseeing all aspects of patient care. This is where the problems of coordination and communication can arise. Excellent coordination of trauma patients is required as they are a complex patient group. As previously discussed, trauma patients require multiple procedures, assessments, investigations and multi-disciplinary staff involvement. Issues such as poor documentation, duplication and inefficiency can arise.

As a result of an increase in trauma patient admissions at the study institution, the above issues were regularly raised in the form of staff complaints. It was felt that an investigation into the problems associated with the management of trauma patients was needed. This was initially conducted in the form of a series of focus groups.

3 - Focus Groups and Staff Survey

3.1 Aim of the Focus Groups and Staff Survey

The aim of the focus groups was to identify trauma patient issues nursing staff considered problematic. These issues once categorised would be used to develop a staff survey, to examine the opinions of both nursing and medical staff in relation to the trauma patient care issues highlighted. It is important to conduct this initial investigation to formally record the consensus of opinion in trauma patient care, to demonstrate that staff felt there was a need for some form of intervention to resolve trauma patient care problems, and to establish a benchmark for staff satisfaction levels prior to the implementation of trauma case management.

3.1.2 Focus Group Introduction and Background

As a result of increasing complaints received by the trauma service from nursing staff regarding trauma patient management, a series of exploratory focus groups were conducted amongst nurses from the Emergency department (ED), high dependency surgical ward and several general surgical wards. The purpose of conducting the focus groups was to identify and ultimately investigate which trauma patient issues nursing staff considered problematic.

In their paper discussing methods for focus group evaluation and research (Sim & Snell 1996) describe a focus group as a 'group interview centred on a specific topic ('focus'). This interview is facilitated and co-ordinated by a moderator or facilitator – which seeks to generate primarily qualitative data, by capitalising on

the interaction that occurs within the group setting'. Sim (1998) adds that focus groups are widely accepted as a tool for identifying appropriate fields for development of more structured research mechanisms, such as a formal survey. Beyea & Nicoll (2000b) summarise the advantages and disadvantages of focus groups as follows:

3.1.2.1 Advantages of Focus Groups

- Ability to collect data from many people in a short time
- Quick economic, and efficient approach to obtaining information
- Group experience usually more positive for participants
- Facilitates discussion among participants
- Group members have opportunity and find support from other group members

3.1.2.2 Disadvantages of Focus Groups

- Participants may hesitate to discuss their beliefs
- Quiet participants may not feel comfortable voicing concerns or issues
- Individuals who do not like groups may not attend
- One or more participants may monopolize group discussion
- Interviewer or moderator bias can occur
- The right questions might not be asked
- One opinion may prevail in the group
- Data analysis may be time and resource consuming

3.1.3 Focus Group Methodology

In an effort to maximise the advantages and minimise the disadvantages of focus group research, purposive sampling was conducted by recruiting nurses from the range of clinical areas in which trauma patients are nursed. Purposive sampling is simply considering the purpose of the focus group when determining the sampling methods. Group members should have similar backgrounds relating to the groups purpose (Beyea & Nicholl 2000). For example, in conducting focus groups investigating trauma patient care issues, it is essential to recruit nurses who work with trauma patients under similar circumstances, that is, from wards of similar acuity.

Participants were recruited via flyers placed on each surgical ward and in the ED within the hospital (see Appendix 5). The Nurse Unit Managers for each area also assisted in recruiting nursing staff. In an instructive paper describing methods in conducting focus groups, Beyea & Nicoll (2000a) recommend the use of token incentives as part of recruitment strategy. However, inducements were avoided in order to recruit participants willing to attend the groups and thus have the potential to be more interactive and productive.

As group dynamics are central to the focus group's success, managers were not included in the group in an effort to avoid any domination or feelings of apprehension that may occur. In addition, group composition was relatively homogenous in terms of trauma care knowledge, level of education and clinical area of employment. The recruitment process aided homogeneity. Each group contained nurses from the same clinical area. Of the four focus groups conducted, there was a group representing the Emergency Department (ED), a

group representing the high dependency surgical unit, a group representing the orthopaedic and upper gastrointestinal wards. The fourth group consisted of nurses from the vascular and neurosurgical ward. The third and fourth groups were each a combination of 2 wards. These wards are on the same floor and the nurses have weekly in-service education sessions together. Sim (1998) published an excellent overview of issues concerning analysis and collection of focus group data and writes that the more homogenous the membership of the group, the more confident individual group members are likely to be in voicing their opinions.

A series of four focus groups were conducted in the delegated nursing inservice-education time. The length of time of each group ranged from 60 to 100 minutes. Each group contained 6 to 8 nurses with varying experience levels. Each group consisted of representatives of nursing staff from each ward that provides care for trauma patients, the participants had worked together for at least 6 months.

The same moderator conducted each focus group, and a co-researcher was present to assist with scribing in the event tape recording failed, and to observe group interaction and body language. The co-researcher was utilised for these purposes to prevent the moderator causing group disruption whilst scribing (Beyea & Nicoll 2000a) It is noted that the moderator's personal skills and attributes have a 'considerable influence on the nature and quality of the data gathered' (Sim 1998). All effort was made by the moderator to remain in control of the group and actively facilitate whilst listening effectively, remaining empathetic and aware of non verbal communication and being reflectively

encouraging. In Roberts (1997) paper on planning and conducting a focus group, she states that the possession of the above skills by the moderator is considered essential in the performance of successful focus groups. In addition, every attempt was made to involve all focus group participants in discussion.

The same series of questions and prompts was used in each group, although flexibility was maintained when the group raised unanticipated issues. As a result of group discussion and expansion on various themes questions were not always asked in the same sequence. As Beyea & Nicoll (2000b) recommend in their paper discussing collection, analysis, and interpretation focus group data, to maximise the advantages of focus group discussion, questions progressed from broad to specific, and a simple, neutral question was used to initiate the discussion with the aim of facilitating each participant's comfort. Each focus group was recorded on audiotape after gaining permission from the group. Transcripts were created and analysed. The transcripts were initially organised by questions and prompts, sorted by focus group. This resulted in a complicated series of documents that were then summarised into tables, allowing identification of recurrent themes. These tables were coded according to topics and content.

Organisation of the data as mentioned above enabled the recurrent themes of communication, documentation, coordination, staffing, pain management and education to be developed into a staff satisfaction survey.

3.1.4 Focus group results

Each group overwhelmingly identified a lack of communication between teams, poor documentation and a lack of awareness of the trauma patient management plan. Other issues identified included inadequate pain management, delayed discharge, difficulty in getting x-rays and patients reviewed, a lack of holistic perspective, and poor documentation.

The following questions were asked in each focus group.

1. How do you feel about looking after trauma patients?

The range of emotional responses varied greatly and was often dependent on experience levels. The nurses expressed their feelings in terms such as: confident, anxious, excited, anticipation, isolated, fear, stressed, good, a lot of sorting out, dread, pressure and increased workload. Some of the reasons given by the nurses to explain these emotions included poor staffing levels and a lack of experienced staff. Emergency nurses tended to view trauma as

> *"Quite a challenge, every trauma patient is different, there's always new things and learning is continuous"*

The majority of ward nurses were more negative.

> *"There is poor communication between teams. It is unclear exactly which team should be calling the shots. I spend a lot of time on the phone trying to find out exactly what should be happening."*

> *"Chasing teams is really hard".*

Perhaps this is because in the ED the trauma patient receives prompt attention and tends to be admitted reasonably quickly. The trauma patient is often seen as exciting and unpredictable. However, once the patient is admitted to the ward, the patient may remain for several weeks or months.

2. Do you think that the nursing care of the trauma patient differs from your other patients?

The majority of nurses felt that looking after a trauma patient was different, particularly in relation to increased workload. Ward nurses were concerned about a lack of protocol and coordination.

> *"The patient is not looked at as a whole by individual teams"*

> *"Multiple teams increase workload, increase hassle, and pain isn't managed properly"*

ED nurses described a more systematic approach, which prevented "things being overlooked' and more protocols. The universally conducted trauma assessment tools of the primary and secondary surveys could explain this variation between ED and ward nurses. The primary and secondary survey are systematic methods of assessing the trauma patient. The primary survey is commonly known as "ABC", an abbreviation for assessment of the trauma patient's airway, breathing, and circulation. The secondary survey is conducted when the "ABCs" are deemed stable by the trauma team leader. The secondary survey is a thorough evaluation of the trauma patient from 'head to

toe", that aims to identify any further potential injuries. Other than the tertiary survey, the same routine does not exist for multi trauma patients once they are admitted. The tertiary survey is conducted on the ward 24 hours after the patient has been admitted. The tertiary survey is a repeat of the "head to toe" secondary survey, and also involves reviewing all radiology and other tests initially conducted. The tertiary survey also involves the documentation of a plan of care. Single system injured patients have the potential to have a clinical pathway applied, although Latini (1996) writes that this method of care delivery is not yet widely accepted for trauma patients in Australia.

3. Are you confident when caring for trauma patients, by this I mean, are you always certain of what you are doing?

All groups identified problems with inexperienced medical and nursing staff, however if they were unsure of a specific type of treatment not common to their ward speciality, each group said they would call the educator or a nurse on the relevant speciality ward. Each group felt they needed more education, particularly those on the wards, perhaps because at the time of this investigation there was no formal trauma inservice occurring at ward level. This demonstrates that the nurses have a good understanding of what educational resources are available to them, however the need for and benefit of regular trauma inservice-education is recognised.

4. Are there any specific issues that make looking after a trauma patient difficult?

Each group overwhelmingly identified a lack of communication between teams, poor documentation and a general lack of awareness of the trauma patient management plan.

> *"Communication is an issue when it is a multiple team trauma. Doctors will converse amongst themselves and mysteriously think that the nurses have read their minds and know exactly what to do next"*

> *"Patients seem to languish on the ward longer because the multiple teams aren't communicating properly"*

> *"One team may order something that an hour later another team comes along and ceases the order. What do you do? The teams just don't talk between each other"*

Other issues identified included inadequate pain management, delayed discharge, difficulty obtaining timely x-rays and patients reviewed, a lack of holistic perspective and poor documentation.

> *"The teams don't always write up their plan, usually the patient will tell you… this is a worry….is the patient accurate?"*

5. Are there any issues that you can think of that come up when your trauma patient has multiple teams?

Once again issues such as poor communication between teams, conflicting treatments, poor documentation and no multi-system focus were raised. Interestingly one nurse from high dependency said in relation to team responsibility for the trauma patient

> *"One team will say that it's not their problem, so you call the other team, and they pass the buck…the patient picks up on this and is as frustrated as we are"*

6. Are you usually aware of the plan of care for your patient?

The majority of participants in each group said no, and two groups mentioned that weekends were worse. The barriers associated with this lack of knowledge were not investigated in detail, however poor verbal and written communication between medical and nursing staff was again highlighted.

7. Do you have any suggestions to facilitate and improve trauma care?

Each group suggested improved written documentation, and continuity of care and coordination were also recurrent themes.

"The plan needs to be written down so that the next team looks at it and knows where things are up to"

"We need someone to look at overall care of the patient, maybe a dedicated nurse or team to oversee the patient's care"

3.1.5 Focus group results and purpose summary

The nursing staff participating in the focus groups highlighted several vital issues, encompassing many aspects of communication, documentation, coordination and resources. The goal of the focus groups was not to provide definitive conclusions regarding trauma patient care issues, but to enable identification of major themes and provide insight into key concerns of staff providing care for trauma patients and to develop the resultant questionnaire. The survey and comments from the focus groups would in turn provide some justification for the implementation of TCM, and a benchmark for staff satisfaction levels.

These intentions and results verify statements by Robinson (1999) who in discussion on the use of focus groups claims that the aim of focus groups is not to reach a generalised statement of opinions. These intentions also concur with focus group guidelines published Agar & McDonald (1995) who contend that the use of data acquired from focus groups as the sole form of qualitative research contributes to a casual or shallow understanding of the study results. This information could then be used to determine a benchmark for staff satisfaction levels with trauma care prior to the implementation of TCM. The staff survey is presented below.

3.2 Staff Survey

The focus group data analysis enabled selection of appropriate categories to design a survey investigating staff satisfaction and impressions regarding trauma patient care.

3.2.1 Aim of the Staff Survey

To investigate the satisfaction levels of nursing and medical staff caring for trauma patients in relation to communication, documentation, coordination and resources. These categories were the common themes expressed by nursing staff in the focus groups.

3.2.2 Staff Survey Methodology

In July 2000, health care professionals who were directly involved in the care of trauma patients during the year 2000 were asked to respond to a likert scale staff satisfaction survey with responses ranging from strongly agree to strongly disagree (see Appendix 2). A cover letter explaining the purpose of the survey was attached to the document. Demographic data was obtained on employment status (doctor/nurse), place of work and years of experience. Surveys were sent via internal mail to the Director of the Divisions of Critical Care, Surgery and Emergency. The Directors then attached a letter of support requesting that each consultant and registrar in the coinciding specialty complete a survey. The surveys were distributed via internal mail and placed in the appropriate staff member's pigeon hole. Junior medical staff from each surgical team were asked to complete the survey, they obtained the survey through their registrar. The nurse unit managers from each ward involved in caring for trauma patients

were given the appropriate number of surveys for their staffing levels. The nurse unit managers completed the survey and requested that their nursing staff also completed the survey. Respondents included nursing management, nursing staff and medical staff of all levels. The surveys were returned to the Department of Trauma and Retrieval Services by internal mail.

The issue of communication was considered in relation to its impact on discharge delays, quality of patient care and consistency between medical teams. In addition, staff awareness of the patient plan of care, and resultant effect on staff workload was examined. Adequacy of documentation as a form of communication was investigated in terms of discharge delays, patient plan awareness and pain management.

Coordination of patient care was investigated by asking respondents if they were aware which medical team had overall responsibility for the patient, and the ease of obtaining patient review. The effect of inexperienced staff on the workload for medical and nursing staff, patient acuity and equipment utilisation were also examined.

Each question was in the following format, respondents were asked to place a tick in the box corresponding to their opinion. For example:

Information documented about the care of trauma patients is adequate.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree

Data was entered into an excel spreadsheet. Responses were coded numerically. The data was then transferred to SPSS where frequency distributions were calculated for each question. Demographic data enabled comparison of responses to be conducted according to employment status

3.2.3 Staff Survey Results

One hundred and forty eight surveys were sent out, there were 104 respondents. 80 nurses and 22 doctors completed the survey. This is equivalent to a 70% response rate. 99% of respondents agreed that communication between care providers is essential in providing high quality care, yet 57% of respondents stated it is hard to care for trauma patients as a result of poor communication between teams. Only 21% of staff felt that communication amongst carers for trauma patients was good, and 70% stated that patient discharge is delayed because of poor communication.

70% of respondents thought that information documented about the trauma patient is adequate however only 58% of respondents clearly understand the plan of care by reading the patient notes. 42% of respondents considered that medical teams are in agreement as to who has overall responsibility for care of the trauma patient. Interestingly, this reflected the sentiment of only 36% of medical staff. 60% of staff felt that obtaining review of the trauma patient by the appropriate team is often difficult and 31% of respondents were of the opinion that pain management was adequate in the trauma patient.

85% of staff agreed that workload is increased by inexperienced medical and nursing staff. In addition, 76 % of respondents felt that care would be improved by having one person overseeing care, and 74% of staff said they would access a trauma case manager to assist in trauma care provision.

3.3 Focus Group and Survey Discussion

Examination of the discussion transcript in sequence revealed that different groups were hesitant and uncertain in responding to some prompts where another group was confident and assured. Comfort or knowledge of nursing staff in relation to various questions can perhaps explain this observation of the focus group discussion. In a paper discussing issues of analysis and interpretation in focus groups, Reed & Payton (1997) state that this does not mean that questions were inappropriate, rather that the ability to identify these differences in group respondent confidence are a 'finding in themselves' and a result of data linking and coding.

Reed & Payton (1997) also caution researchers about dominant group members. As participants in each of the trauma focus groups had a working relationship, it could be suggested that they were susceptible to group culture, preventing spontaneous discussion. It is recognised that previously established power relationships may have existed, however all participants were involved in discussion. Perhaps this is an outcome of the recruitment process, which ensured that the nursing staff wanted to be present at the focus group to voice their opinion, or even vent their frustration regarding trauma patient care issues. Furthermore, in discussing focus group analysis issues, Sim (1998) adds that there is a tendency for the more self-confident and articulate individuals to be more willing to take part

in a focus group.

The results of the staff satisfaction survey paint a grim picture of the standard of communication amongst trauma patient care givers. The general consensus was that communication and resultant awareness of management plans and aspects of patient care were poor. The opinions of staff towards the importance of effective communication can assist in explaining the frustration exhibited by nursing staff in the focus groups. It is well recognised that communication is essential for effective care provision, but a lack of effective communication exists, and this creates dissatisfaction. These results support the findings of the focus groups, such as poor communication and a lack of awareness of the patient care plan, and confirm that the issues raised in the focus groups are more widely experienced.

The following themes, each having many dimensions, were identified in relation to trauma patient care: communication, documentation, coordination, staffing, pain management, and education.

3.3.1 Communication

Communication and related issues can be summarised into the following groups: verbal communication, documentation, awareness of plan, and consistency between medical teams. Working with others effectively in health care is a challenge. Communication and human relationships with all those involved in the patient's care impact on nursing practice, patient care and how nurses feel about themselves. Brereton (1995) discusses the characteristics of

communication and the concept of learning communication in the contexts of nursing theory and practice. She states that there are several basic principles to effective communication in the workplace. These include:

1. An appropriate knowledge base;
2. A range of behavioural skills that are essential to effective performance, such as authenticity, empathy, active listening and respect for others;
3. A positive attitude towards communicating;
4. The availability of opportunities to communicate.

Barriers to effective communication between nurses and doctors are well known phenomena. Research has identified several specific issues which contribute to ineffective communication between the doctor and nurse. These include the perceived level of competence of the nurse by the doctor, nurses feeling that doctors will be unpleasant, and that doctors do not value nurses opinions. Featuring in Arnold & Bogg's (1995) text on interpersonal relationships, O'Mara (1995) reviews the issues surrounding communication with other health care professionals. O'Mara (1995) states that differences in awareness about the scope of practice and regulatory requirements between groups may offer a partial explanation for the above perceptions. In addition, Sweet & Norman (1995) add that broader ongoing differences in professional and social culture, gender roles, age, power, ethnicity, language and social status may reflect causes of these perceptions. However the nurse-doctor issues do not explain the lack of communication between medical teams. Heenan (1991) reports that staff dissatisfaction remains as a result of the nurse doctor relationship. Moreover, in a selective literature review on the nurse-doctor relationship, Sweet & Norman (1995) state that poor working relationships have negative

outcomes on patient care. The cause of the problem may indeed be a lack of desire to communicate with underlying power and knowledge issues or perhaps more simply may be a result of staff not understanding the importance and effects of good communication.

Organisational behaviour can explain some aspects of communication breakdown. In their text on a behavioral approach towards organization management, (Petzall, Selvarajah, & Willis 1992) describe the major concepts of organisational behaviour as incorporating group dynamics, encompassing cohesion, status, norms and role/power. Other concepts include group size, individual features of people within the organisation and structural faults. Group behaviours and communication may be controlled to an extent by group dynamics. These dynamics are a result of complex and interdependent forces of each individual in the group. From this series of individuals, the group, for example, surgical specialty develops its own personality which differentiates them from other groups within the organisation. In defining communication and causes of personality types and their impact on communication Ellis (1995) states that there are many different factors which contribute to an individual's personality. These include self esteem, attitude, anxiety, values, beliefs, prejudices and defence mechanisms.

The organisation, in this instance the hospital, requires certain results from individuals and groups, for example, quality patient care from an individual and budget adherence from administration. The hospital establishes institutional norms, such as specific rules, procedures and guidelines. An understanding of these norms by the appropriate group is essential for their adherence and

performance (Petzall, Selvarajah, & Willis 1992). An example is provided by (Porrit 1991) in his organisational behaviour text focussing on interaction strategies for health professionals: A nurse needs to understand that they are required to document the date and time of each dose of antibiotics they give. If the hospital expects the nurse to comply with this norm, it is their responsibility to ensure nurses are aware of this policy. In the same way, the hospital needs to enforce communication norms with medical staff and patient care. In spite of this, group dynamics may still prevail.

Regardless of the cause of ineffective communication, the issue must be addressed amongst the trauma care giver population. Effective communication contributes greatly to the success of an organisation. In a paper investigating causes of critical incidents and crucial issues, Perry (1997) states that poor communication is one of the most common elements of undesirable incidents and stress. In Sutton's (1999) paper on retaining registered nurses in her US Emergency Department, she states that the stress created for nursing, allied health and medical staff associated with poor communication can have adverse effects. In addition Wolfgang's (1988) generalized health professions stress inventory, which examined levels and causes of stress in pharmacists provides support for Erlen & Sereika's (1997) position. They stated that stress placed on critical care nurses decreases enthusiasm, impairs problem solving capabilities and a that a decrease in the quality of patient care can result from poor communication.

3.3.2 Coordination

Gross (2000) reports that at the United Kingdom 2000 Colloquium on Clinical Quality Improvement, a roundtable of health care experts compared experiences in implementing evidence-based practice guidelines for health care. It acknowledged that while enormous advances have been made in developing new technologies and information systems, more focus was needed on coordination of care. In the same forum, Schoenbaum (2000) added that while patients may be satisfied with each individual health professional, they recognise that the overall episode of care is often poorly coordinated or managed. In complex interactions, errors or poor care are frequent. Menadue (2000) of the NSW Health Council, stated that Australia is undergoing a similar realisation. This status requires the standardisation of processes of care and managing the communication and collaboration between patients and health professionals and between the health professionals themselves. The alternative is continued escalation in the cost of care, dissatisfied patients and suboptimal outcomes. At the aforementioned roundtable Meyer (2000) of the agency for healthcare research suggests that changing physician behaviour should not be the primary focus. Instead, Meyer (2000) states that designing systems that will facilitate change should be of more importance. In light of Meyer's opinion, the implementation of trauma case management, may facilitate system change at the study institution.

3.3.3 Collaboration

Collaboration among health care disciplines is well supported as an effective solution to many problems, particularly fragmentation amongst complex patient groups. In writing about collaboration between nurses and physicians, Fagin (1992) states that collaboration is a process of shared planning and action toward common goals with joint responsibility for outcomes. Multidisciplinary care involves the sequential provision of discipline-specific health care by multiple providers. The trauma patient, or any complex patient, requires care from multiple disciplines. Without coordination, decision-making, communication, shared responsibility and shared authority, care suffers.

3.3.4 Resources

Recurrent themes in the focus groups included poor staffing levels, skill mix and inexperienced staff. Crisp & O'Brien (2001) in their report to the committee of delegates for the peak forum on skill mix and models of care in NSW state that skill mix refers to the percentage of nursing staff with qualifications, their levels of competence and abilities, their knowledge and experience. Crisp & O'Brien (2001) add that retention of experienced nursing staff is an increasing problem worldwide, mainly due to active nursing budget cuts, as nurses are seen as the largest cost to an institution. In an editorial in the Journal of Emergency Nursing, Lenehan (1999) states suggests that the budget cuts also resulted in minimisation of resources and decreases in hospital bed numbers. In a discussion on the issue of nursing staff retention, Fisher (1999) states that the implications of budget cuts for nursing staff are higher nurse patient ratios,

increase in junior staffing levels, a forced decrease in the standard of patient care, and ultimately 'burnout'. The literature collectively agrees that work performed by nurses is tremendously difficult in the current climate. Knies (1999) adds that nurses are constantly asked to do more with less. The patients being cared for are more acute and their cases more complicated. Methods to attempt to alleviate the burden on registered nurses have been trialled and are being further investigated. In a paper on strategies for recruitment and retention of critical care nurses, Huttner (1990) suggests increased junior staff supervision by mentors, and utilisation of enrolled nurses or other personnel to perform tasks that do not require a registered nurse may ease nursing workloads. Although the use of less skilled staff for traditional registered nursing intervention is an ongoing and controversial issue.

3.4 Conclusion of Focus Group and Survey Research

Nurses are in an occupation that has interpersonal communication at its core. The nursing and medical staff in focus groups and the staff survey raised several vital issues, encompassing many aspects of communication, collaboration, coordination and resources. These issues are primarily related to poor communication increasing stress amongst nursing staff who are already employed in a profession which is under strain. The nurse-doctor relationship and organisational behaviour concepts such as group and personality dynamics can contribute to added frustration.

Whilst many issues were raised by nursing staff in the focus groups, it was not considered feasible to include them all in the survey, or within the scope of the aims of the focus group research. That is, to identify and categorise the

predominant issues associated with trauma patient care delivery.

It is evident from the focus group and staff survey results that a program is required to be implemented that focuses on the improvement of provision of care for trauma patients. TCM has been described as able to promote teamwork, communication and coordination, which are principal concerns identified in the exploratory focus group and staff survey investigations. In addition, TCM is described as being able to improve financial performances by decreasing length of stay, preventing duplication, and streamlining resource use. TCM at the same time improves quality assurance, which leads to improved patient and staff satisfaction (ENA 1999).

Thus a pilot study investigating the impact of TCM on selected patient outcomes and staff satisfaction issues including communication was conducted.

4 -Trauma Case Management Pilot Study Methodology

4.1 Planning

After extensive literature review and discussion with trauma coordinators in the United States, a TCM pilot study proposal was developed. The proposal was circulated to the Divisional Heads, trauma surgeons and nursing administration. The proposal discussed the need for TCM at the study hospital, and included a literature review, trauma case manager job description and proposed method of implementation. Full support was gained from the organisation.

Meetings were arranged with a representative of every discipline involved in trauma care. These included:

- Emergency physicians, general, orthopaedic and neurosurgical consultants, registrars, residents and interns;
- Nurse unit managers of wards which receive trauma patients;
- The nursing educators for the Division of Surgery;
- Physiotherapists;
- Social workers;
- Occupational therapists;
- Discharge planners.

Once the above people were made aware of the TCM role, an intensive series of education sessions for nursing staff in the ED and ward areas was conducted. Junior medical staff were informed of the program at hospital orientation sessions.

It was recognised that due to limited staffing availability there was a lack of resources within the trauma service to provide after hours and weekend management and provide TCM for all trauma inpatients. To compensate for lack of resources, TCM would only be provided Monday to Friday during the specified working hours of the current trauma nurses. In addition, inclusion and exclusion criteria were established. With the trend of about 60 inpatients per month, and usually 15 inpatients at any one time, it was not feasible to provide TCM for all patients admitted under trauma surgeons with the available staffing levels. Thus patients with an ISS greater than 15 were excluded, as they are generally cared for in the intensive care unit where they have a high staff to patient ratio, thus decreasing coordination issues.

The greatest need for TCM seemed to be in the High dependency surgical unit (HDU) and the general wards rather than the ICU. This is most likely due to a poorer staff to patient ratio. In the ICU there is one nurse allocated to care for each patient, in addition, a supernumerary senior staff member is present on each shift. Once a patient is transferred to a less acute nursing environment, the staff-patient ratio becomes much lower. In the HDU there is one nurse for every two to three patients, and on the general wards, each nurse is required to provide care for up to eight patients. These altered ratios result in an increase in patient load for the nurse, an increase in fragmentation of services, and a lower acuity in comparison to the ICU trauma patient. Nurse managers and nurses on these wards have expressed the need for better communication, documentation, co-ordination and more expedient patient review.

In addition, the author was awarded a scholarship from the Royal Australian College of Surgeons for the purpose of improving the quality of trauma care at the study hospital and ultimately on a larger scale. In September 2000 the author visited several teaching hospitals in the US to study their implementation of TCM, and to determine how the study hospital might adopt aspects of US TCM models. The author also attended a Trauma Co-ordinator Core Course conducted by the American Trauma Society. A large component of that course focused on the implementation of TCM.

After further consultation with pertinent organisational staff, discussion was held on evaluation methods. It was decided that the purpose of the study was to measure the effect of TCM in a major Australian trauma centre using practice-specific variables such as in-hospital complications, missed injury rates and LOS. Other measures included staff satisfaction in caring for trauma patients and use of allied health services.

4.2 Aims

The purposes of this inception cohort study was to determine the effect of TCM on patient outcomes including length of stay (LOS), in-hospital complications and missed injury detection rates. The impact of TCM on other outcomes, including staff satisfaction in relation to trauma patients, utilisation of allied health personnel amongst trauma patients and clinical coding accuracy were examined.

The LOS of specific subgroups was examined in addition to overall LOS, including age groups below and above 50, patients with an Injury Severity Score (ISS) less than 8, and between 8-15 (inclusive). The comparison of the patient groups based on ISS was of interest because the group with the higher ISS (8-15 inclusive) was more likely to have multiple injuries, and require more coordination.

Finally, this research was a pilot study with the goal of exploring the efficacy of TCM in an Australian context. The hope was that such a study would reveal trends worthy of a larger scale investigation.

4.3 Methods

4.3.1 Study Design – Ambispective Inception Cohort

There is much confusion regarding the definition of a "cohort study", perhaps because it has one core definition but multiple actual study applications. The original dictionary definition of "cohort" originates from the Latin word "*cohors*" and describes an enclosed yard or company of soldiers. In Roman armies, the same types of soldiers (for example cavalry) were in each cohort (Panacek 2000). In today's times, a cohort refers to a group of individuals that are similar in some trait and move forward together as a unit. The epidemiological definition of "cohort" is a group of individuals that share a common characteristic, for example, a birth cohort that describes all individuals in a certain geographic area born in the same period (usually a year) (Panacek 2000). In terms of this study, the subject cohort is a group of individuals that have all been admitted to the study institution as a result of fulfilling the same trauma criteria.

An Inception cohort is when all individuals are assembled at a given point based on some factor, for example, where they live or work (Panacek 2000). In the case of this study, all subjects are residing in the tertiary trauma institution. This study also contains elements of an exposure cohort, which is where individuals are assembled as a group based on some common exposure, for example, radiation exposure during desert testing (Panacek 2000). In the case of this investigation, all subjects are victims of trauma.

The study design was an ambispective inception cohort with internal controls. A single group was investigated with both prospective and retrospective components (ambispective) and all patients fulfilled the same criteria (internal controls) (Panacek 2000). An ambispective cohort study design was selected because whilst it was deemed possible to gather the control group data prospectively, the time frame for the completion of the study would have been greatly lengthened. The control group data already existed in the trauma service database, and although retrospective was considered accurate. The group impacted by TCM had to be prospective, as TCM was a new intervention. Generally, cohort studies involve two components, exposed and unexposed groups, as is the case with this study, only one group was exposed to TCM. Panacek (2000) suggests that as inception cohort studies are often performed retrospectively a better name would be "Exposed-unexposed study" unfortunately this name has not been widely adopted.

A cohort was assembled based on the subject being admitted and fulfilling trauma criteria (see table 5). The cohort was examined in two stages. The control group retrospectively, enabling a benchmark for the outcome measures. The control patients were identified using the trauma service database. The trauma and casemix databases provided the outcome measurement data. The prospective or study group was identified using the same criteria as the control group in real time, so as to enable the trauma case managers to intervene in their care. Comparison between the two groups allowed the calculation of incidence rates and other descriptive measures for the selected patient outcomes as previously mentioned.

It was decided to use a cohort study design rather than a randomized control trial (RCT), for if a RCT was initiated, some patients would not be exposed to the interventions of the trauma case manager. To provide a service to some trauma patients, and not others was considered unethical, given the author had the suspicion, and some anecdotal evidence that TCM would improve patient care and outcomes. In addition, the field of TCM investigation is immature and limited research resources were available. The study had a limited timeframe as the nursing staff were implementing TCM in addition to their existing role. Even if a RCT was considered ethical, in order to obtain adequate subject numbers, the trial would have taken 12 months instead of 5 months. It was not considered feasible to continue this practice for this extended period of time, given that the nursing staff already possessed had a very heavy workload.

In conclusion, the strengths of using a cohort study design for this research include the following;

1. The best way to study incidence of the outcome
2. Much less expensive than RCTs
3. Sometimes the best or only ethical way to do the study, that is, one cannot or should not randomize

The weakness of Cohort study design in this research was that retrospective data was used, and validity is dependent upon the adequacy of records. This issue is addressed by the excellent quality of the study institution's trauma service database. The trauma data manager audits each data entry and the trauma coordinator conducts regular quality assurance audits.

4.3.2 Sample Group and Resources

The study hospital is a 600 bed urban Teaching Hospital of a major NSW University. It is a designated Trauma Centre, seeing around 200 patients with ISS>15 and around 2500 injury admissions per year. The 5 month study period commenced in August 2000 when 1.5 full-time equivalent TCM positions were filled by two Trauma Nurses, in addition to their existing workload. They were on duty between 9am to 5pm Monday to Friday, and on Sunday, between 11am and 5pm. In the 5 month study period, 147 patients were identified. In the previous 12 months 338 patients had fulfilled the study criteria (see below).

An Inception Cohort Study using historical or retrospective controls from the previous 12 months (n=338) was conducted. The study hospital trauma database was utilised to extract the relevant data. It was not considered feasible to provide TCM for all patients admitted under trauma surgeons with the available trauma nursing staff thus data was collected on patients who met the following criteria.

1. Trauma database entry, which requires the patient to possess one criteria from three possible fields. The fields are "mechanism of injury", for example a motor vehicle collision at speed > 60 kph, "vital signs", for example decreased level of consciousness or "injuries", for example an injury to two or more body regions. For a complete list see Table 5
2. ISS <16 (less severely injured and less likely to be admitted to ICU)
3. Age 15-69 (inclusive)
4. Interhospital transfer and ICU patients were excluded.

At the beginning of each shift, the case manager identified potential patients for study inclusion. The case manager checked every patient admission to the Emergency Department (ED) using the computerised "EDIS" system, which contains information on each patient's reason for presentation to the ED. They then attended the ED or ward (if the patient had already been admitted) to assess the patient's suitability for inclusion.

4.3.3. Role of the Trauma Case Manager

The trauma case manager performed a daily round of all patients fulfilling the criteria. On first contact with the patient, the case manager would read the patient notes and attempt to ascertain the plan of care. They would also talk to the treating medical teams and nurses to gain an impression of the patient's status. If a plan was not identified, the case manager would contact the relevant medical teams to aid in developing the plan. They would then ensure that nursing staff, the patient and their family were aware of the plan. If warranted, the case manager initiated referrals to allied health staff and sub specialty teams, such as the pain, alcohol and other drugs and psychiatry teams.

Table 5: Trauma database entry criteria

TRAUMA TRIAGE / ACTIVATION CRITERIA
History / Mechanism of Injury:
Motor Vehicle Collision at speed > 60 kph
Pedal Cyclist struck by motor vehicle at > 30 kph
Adult pedestrian struck by motor vehicle at > 30 kph
Child pedestrian struck by motor vehicle at <u>any</u> speed
Fall greater than five (5) metres
Patients presenting via the Ambulance Service executing Protocol 4 (ie. bypassing another hospital)
Vital Signs:
Shallow or retractive breathing
Cyanosis or oxygen saturation < 90%
Skin pallor or delayed capillary refill
Systolic blood pressure < 90mmHg (if age > 5 years) or < 80 + {2 x age in years} for children
Heart rate < 50 or > 130 beats per minute
Decreased level of consciousness or fitting
Pupil(s) dilated or unreactive
Injuries:
Injury to two or more body regions (ie. neck, chest, abdomen, pelvis, back or long bones)
Fracture of two or more long bones
spinal cord injury (actual or suspected)
Crush injury or amputation of limb
Penetrating injury to head, neck, chest, abdomen, groin or back
Facial and / or airway burns
Burns > 15% in adults or > 10% in children

As part of the round the case manager completed a progress sheet of any interventions performed. Many of the interventions performed by the Trauma Nurses can be grouped into the following categories:

- A daily ward round and review of patient notes;
- Identifying and addressing any conflict in medical orders or lack of management plan;
- Collaborating between multiple care givers and fostering communication between medical teams and paramedical and nursing staff;
- Identifying barriers to discharge and contacting relevant personnel to overcome these;
- Organising pathology or radiology and subsequent review in priority cases;
- Documentation in medical notes of any intervention or alteration in patient care;
- Informing the multiple teams, nursing and allied health staff, and patient of a new development;
- Building a rapport by providing continuity of care with patients and acting as their advocate;
- Reassuring patients by ensuring that they and their families are kept well informed.

Examples of interventions performed by the trauma case manager are given on the following page. These examples highlight many of the coordination and communication aspects of the role.

4.3.4 Examples of TCM Intervention

1. A patient was admitted after being hit by a car. He was admitted under the general surgeons, neurosurgeons and orthopaedic surgeons. The patient had a Thoracic Spine fracture and a knee injury. The general surgeons handed over care to the other teams within 24 hours. The neurosurgeons documented that the patient was to be on bed rest, however a few pages later the orthopaedic surgeons documented the patient could mobilise. The TCM noticed that physiotherapist had been mobilising the patient. The TCM contacted both teams to determine what the status quo was. The neurosurgical team stated that the patient was not to mobilise due to his unstable thoracic spine fracture. The trauma case manager ensured everyone knew this, including the orthopaedic surgeons, nursing staff, physiotherapist and the patient.

2. On a weekend, a stabbing victim had been seen by the surgeon who said that the patient could go home if a repeat x-ray showed improvement and the Cardiothoracic Registrar approved. The trauma case manager contacted the resident on duty who stated he didn't feel comfortable doing all this, that he didn't have time, and that the team could do it on Monday. The trauma case manager organised the x-ray, escorted the patient down, found a radiologist and had the x-ray reported, contacted the cardiothoracic registrar to review the patient and the x-ray, contacted the trauma surgeon at home with the results. The patient went home that afternoon instead of 1 or 2 days later. This was all documented and explained to nursing staff and the patient.

4.4 *Data Collection*

The patient outcomes for which data was collected were LOS, in-hospital complications, missed injury detection, the speed and rate of allied health staff referral. Other outcomes measures were staff satisfaction and clinical coding accuracy.

The study hospital trauma data base was utilised to obtain data on missed injuries, complications and length of stay. Each trauma patient fulfilling trauma activation criteria has a 4-page data form completed by the trauma case manager. This form contains information about the patient's mechanism of injury, pre-hospital and hospital resuscitative care received and a list of injuries sustained by the patient. Prior to implementation of the TCM trial, a trauma research nurse collected this data. This data is then entered manually into the database by clerical support staff. The database record is updated upon patient discharge with any events that have occurred during the trauma patient's hospitalisation. These include surgical procedures, development of complications, detection of missed injuries, number of days in the high dependency unit and independent function in relationship to activities of daily living. The same trauma database was used to extract data for both the control and trial groups.

The study hospital casemix data was used in conjunction with records provided by the trauma data base to provide information on allied health utilisation. Liaison with the casemix unit was conducted by the author. Data containing patient medical record number and date of admission was provided in Excel format to the casemix unit. Excel data was able to be converted and imported

into the casemix database to provide the required information on allied health staff referral.

Medical, nursing and allied health staff that had used the TCM service were asked to complete a Likert scale survey to evaluate staff satisfaction. The survey intended to determine if staff perceived improvement in the areas of communication, documentation, pain management and their awareness of the management plan for the patient. A copy of the survey is available in Appendix 2. Individual staff who had come in contact with and used the TCM service were sent the survey via internal mail. This was to ensure that the survey was being completed by staff who had experienced the intervention of TCM.

4.5 Audit of clinical coding accuracy

As a result of the recognition of coding validity, an investigation of the accuracy of trauma coding at the study hospital was undertaken as part of the TCM trial to identify any aspects which may be improved and have financial consequence.

The funding received by hospitals is based on clinical coding accuracy. The importance of coding has been discussed in the light of new funding models being implemented in NSW.

This fundamental need for accurate coding prompted an audit of clinical information coding in trauma patients as part of the TCM pilot study. Trauma patients are traditionally difficult to code as their care and documentation are complex. Trauma patients require the use of extensive hospital resources. Fernandez (1995) adds that the care of these patients involves high costs, critical care management and intensive nursing care, they undergo multiple surgical procedures and interventions, and their length of stay is often extended. All these issues contribute to coding difficulties.

4.5.1 Coding Methodology

As mentioned earlier, the process of coding at the study hospital is undertaken using International Classification of Disease codes called ICD-10-AM V2 NCCH 2000). At the time of this study, the study hospital was using the latest version of the 3M Coding and Grouping Software distributed by the Commonwealth (Version 4.1) to determine patient AR-DRGs

The 3M Encoder is interfaced with the study hospital database. The study hospital currently uses the patient administration system known as HOSPAS (Hospital Patient Administration System). All codes, MDC and AR-DRG generated by the coder using the 3M product are brought across via the interface into HOSPAS. This coded information can then be accessed by the Casemix unit to produce casemix reports, and in the case of this study, costing data.

At the time of the study, the study hospital had a yearly discharge rate of 43,856 separations (99/00). For the two month period of the study, the number of separations was 7,824. The Clinical Information Coding Department of the study hospital consisted of 5.73 FTE staff. The study hospital has a daily average standard of 35 records per day for each coder.

The co-morbidities, diagnoses, procedures and complications of admissions recorded and entered into the clinical information data base for each admitted trauma patient during August 2000 were supplied to the Trauma Service. The clinical information records were compared with the summary of patient care obtained by the trauma case managers on their daily rounds. The trauma case manager record is an outline of the trauma patient's in-hospital stay, and currently utilised for the trauma service database and associated projects.

Clinical information records requiring alteration were returned with additional information and re-entered into the clinical information database. An Excel spreadsheet contained the patient medical record number (MRN), original AR-

DRG, AR-DRG post trauma service analysis, number of alterations made in primary diagnosis, secondary diagnoses, procedures and complications. The altered clinical information records were then forwarded to the Casemix unit for financial analysis.

4.6 Statistical Analysis

As this was an Inception Cohort Study, statistical analysis had limited relevance. Nonetheless, non-parametric testing was performed using the Mann-Whitney U test for data for overall LOS, age groupings and ISS scores. To help overcome any effect of a skewed distribution, brought about by 1 or 2 patients with unusually high LOS, the median LOS was used as opposed to the average. Rates of complications, missed injuries and Allied Health intervention were analysed with the Chi-square test.

5 - Results

5.1 Patient Outcomes

The study group had 147 patients. The control group had 338 patients. The results show a decreased LOS overall (by 25%), from 4 days to 3 days (Table 6). This equated to 12.6 hours. The benefits were most apparent in older patients (age >50). In this patient group, LOS decreased from 6 days to 4 days, a reduction of 33%. Also, the LOS of more severely or multiply injured patients, represented by ISS scores 8-15, decreased from 5 days to 3 days (40%). This difference was analysed using non-parametric testing for 2 independent samples with the Mann-Whitney U test, because the distributions for both groups were not expected to be normal, and the sample sizes were disparate. These results were not statistically significant.

The missed injury detection rate significantly increased from 0.6% to 5.4% ($p<0.0015$). A missed injury is defined as an injury detected more than 24 hours after admission. Missed injuries detected during the trial included a fractured pubic ramus, a fractured orbit, knee ligament injury, a fractured spinal vertebra at cervical spine level 2, a long bone fracture and omental laceration.

The overall complication rate did not decrease significantly, although statistical projections expected the complication rate to increase. In the pre TCM elderly population the complication rate was 11.7%, in the test elderly population, the complication rate was 0%. Statistical projection expected a complication rate of at least 8.6%. This was not statistically significant as the patient group was quite small.

There was earlier (by 0.54 days) and arguably more efficient Allied Health use. This was most apparent in the physiotherapy and occupational therapy services. A greater usage overall of Allied Health services (36%, *p<0.0001*) was noted.

Table 6: Summary of patient outcome results

Outcome	Pre TCM period n=327	TCM period n=149	p value
Overall LOS	4 days	3 days	0.606(a)
LOS 8-15	5 days	3 days	0.712(a)
Age >50	6 days	4 days	0.084(a)
Missed injury detection	2 pts = 0.6%	8 pts = 5.4%*	<0.0015(b)
Complication rate - overall	21 pts = 6.2%	9 pts = 6.1%	>0.999(b)
- Age >50	7 pts	0 pts	<0.181(b)
Days to allied health intervention	3.25	2.71	0.625 (a)
Patients receiving allied health intervention	22%	58.5%*	<0.0001(b)

(a) = Mann Whitney U (b) = Fishers exact * significant (p<0.05)

5.2 *Staff Satisfaction*

29 respondents completed the post trial of TCM staff satisfaction survey. Staff satisfaction is one of the aspects which are most important, and also one of the hardest to analyse quantitatively, yet the survey results were extremely encouraging. Prior to the trial, only 21% of doctors, nurses and allied health staff felt that communication amongst carers for trauma patients was good. This improved to 86% post TCM implementation ($p<0.0001$). The increase in the number of staff who felt that the adequacy of documentation improved was 86%. 72% of respondents stated that patient discharge was efficient as compared to 30% prior to the TCM trial ($p<0.0001$). 93% of respondents felt that TCM was useful (see Table 7). In addition, respondents felt that coordination and pain management both improved.

Comments from nursing, medical and allied health staff were greatly encouraging, such as;

"I feel confident because you're here, I know you'll sort things out" from a nurse.

And, from a patient and their family;

"*Thanks for letting us know what's going on, even though it's not great news it's nice to know*"

Table 7: Percentage of staff agreeing to the statements in the following categories in relation to trauma patients.

Category	Pre TCM period	TCM period	p value (a)
There is good communication amongst care givers	21%	86%	<0.0001*
There is adequate documentation	45%	86%	<0.0001*
Patient discharge is efficient	30%	72%	<0.0001*
Review by appropriate team is timely	40%	89%	<0.0001*
There is a need for someone to oversee and coordinate patient care	76%		
TCM was useful		93%	
Number of respondents	104	29#	

(a) = Fishers exact test * significant ($p<0.05$)

#Small number as a result of the survey being limited to caregivers in contact with TCM pilot group patients

5.3 Coding

For the months of August and September, there were 100 trauma patient admissions representing 15% of overall admissions for the year 2000 many coding errors and omissions were noted. Of the 100 records, 205 additional ICD-10-AM codes were added following review. Examples of these include superficial injury of scalp (S0001), fracture of shaft of tibia with fracture of fibula (S8221), fracture of skull (S029) and staphylococcus areus as the cause of diseases (B956). 7 codes were incorrect and had to be removed, this resulted in a decreased weighting. For example unspecified injury of abdomen (S399) was changed to, unspecified injury to head (S099) which resulted in the cost weight decreasing from 0.42 to 0.38. 12 principle procedures and 44 additional procedures were also incorrectly omitted, such as management of continuous ventilatory support and computerised tomography of brain.

The error rate was calculated using the following formula:

$$\frac{\text{Number of records with an error}}{\text{Total number of records}} \times \frac{100}{1}$$

The error rate was 74%.

28% of recoded records had to have their AR-DRG's changed, which resulted in the identification of over $39,000 of additional funding (See Table 8). The largest increase ($8,544) was for a patient regrouped from category Craniotomy with Severe or moderate cc (B02B) to Catastrophic cc (B02A). The average increase in funding per revised AR-DRG was $1,427.

The change in AR-DRG rate was calculated using the following formula:

$$\frac{\text{Number of records with an changed DRG}}{\text{Total number of records}} \times \frac{100}{1}$$

The rate of records requiring DRG change was 28%.

Table 8: Results of Clinical Information coding audit.

	August	September	Total
Number of records recoded	46	54	100
Number of records requiring additional codes	40	34	74
Total number of additional codes			205
Error rate			74%
Number of records where AR-DRG changed	12	16	28
% of records where AR-DRG changed	26	30	28
Increase in funding* due to revised AR-DRGs	$28,536	$11,424	$39,960
Average increase in funding per revised AR-DRG	$2,378	$714	$1,427

*Using Acute Cost Weights excluding ICU & ED from NSW Costs of Care Report 98/99 (NSW Health Department). Based on $2,400 per casemix weighted separation from NSW health (2000) episode funding guidelines 2000/01.

6 - Discussion

6.1 Length of Stay

Despite a 25% decrease in median LOS, from 4 days to 3, this result did not reach statistical significance. In comparing patients who were more likely to be multiply injured, represented by ISS scores 8-15, versus those more likely to have single system injuries, with the lower ISS scores, the LOS decreased most (2 days) in the more severely injured patient groups. Patients aged more than 50 years were more likely to have a decreased LOS (2 days). These results suggest that the TCM is most effective with multiply injured and more elderly patients. Multiple specialty medical teams required by multi-system injured patients and the increased co-morbidities of the elderly create a potential for disjointed care and more complex management plans. A decreased LOS in these groups is consistent with research conducted by Allred et al. (1995). Their results demonstrated that case management is more financially beneficial and quality care effective in a work practice environment that is of moderate to high level uncertainty and complexity. Interestingly, trauma centres in the US, such as San Francisco General Hospital (Shagoury 2000), and the University of Pennsylvania Hospital (FitzPatrick 2001) which have a full TCM team, as previously discussed have an average LOS of 2 days in the lower ISS range in comparison to our 3 to 5 days.

LOS is not necessarily the most conducive outcome measure to fully evaluate TCM's true benefit. Hale (1995b) writes a comprehensive discussion of research issues in case management and states that simply reducing the length

of hospital stay could result in increased work for the community staff which they may be unable to sustain. Furthermore, Hale (1995b) adds that decreased LOS may result in an increase in the re-admission rate due to complications. In addition, advances in treatment of patients may mean that in many areas LOS is falling, potentially for reasons which may have nothing to do with the implementation of systems of case management. In addition, whilst the patient may be discharged earlier, the bed will not be closed, or staffing reduced. It will however enable a more rapid transfer of a new patient from the ED, or perhaps an extra elective surgical case to be conducted. This is conducive to decreased 'exit block' from the ED and a shorter elective surgery waiting list.

To demonstrate a statistically significant two day reduction in LOS our study would have needed to enrol 250 patients in each limb of the study. This is based on Altman's power analysis model using α 0 .05 and β of 0.2.

The reduced LOS may be attributed to the following factors:

- increased Allied Health referral
- decrease in in-hospital complications
- increase in the detection of missed Injuries
- improved staff satisfaction
- improved coordination and communication.

6.2 *Allied Health*

The trauma case manager was able to identify which patients needed the service as soon as the patient was admitted. The TCM acted as a filter, ensuring appropriate referrals were made to the service as soon as possible. The allied health staff had adequate time to prepare and plan for discharge of the patient. Despite a 36% increase in Allied health staff intervention, there had been no increase in the levels of allied health staff employment. Discussion of the role of allied health as part of a TCM team was not provided earlier as a TCM team did not exist prior to this study. Also, the exact role allied health staff would play in the TCM team was not clear.

When discussing the concept of maintenance physiotherapy in Australia, (Flanagan & Green 2000) state that physiotherapy is essential in trauma patients to assist resumption towards full and optimum functional capacity and quality of life. Occupational therapy (OT) showed the most significant decrease in time to intervention. It is suggested that prior to TCM, the OT staff were not aware of patient consultation requirements. The OT plays a major role in patient preparation for discharge. Whenever possible, early intervention is highly desirable to expedite restoration of function and to facilitate the establishment of practices that will minimise any disabling effects of the disease or injury. In describing the benefits of physiotherapy, the Australian Physiotherapy Association (APA 2001) states that in the later stages of chronic and/or disabling conditions, physiotherapy can maximise function, improve morale and assist clients and relatives to explore all available potential for the best possible quality of life.

Occupational therapy is another allied health field closely associated with physiotherapy. While occupational therapy generally concentrates on activities of daily living, the ability to dress, cook, clean and manage safely in the home environment, physiotherapy will focus on basic gross mobility skills such as getting out of bed, walking safely with crutches or a walker, moving specific joints and strengthening specific muscles of the body. Both fields overlap somewhat as both provide special splints, hand/upper extremity (arm) therapy, and work hardening/work conditioning programs. Both professions also aim to reduce pain, restore function, and promote as much independence as possible (APA 2001).

Stucky (2001) on a physical therapy website states that occupational therapy is skilled treatment that helps individuals achieve independence in all facets of their lives. It gives people the "Skills for the Job of Living" they need to live satisfying lives. Occupational therapy practitioners are skilled professionals whose education includes the study of human growth and development with specific emphasis on the social, emotional, and physiological effects of illness and injury. Services typically include customized treatment programs aimed at improving abilities to carry out the activities of daily living incorporating comprehensive evaluation of home and job environments, and recommendations on necessary adaptation. This requires assessments and treatment for performance skills as well as recommendations and training in the use of adaptive equipment to replace lost function. Also, guidance to family members and attendants in safe and effective methods of caring for individuals (Stucky 2001). These multiple interventions require extensive planning and time, thus the earlier the referral is made, the sooner planning can begin.

In Australia, Sakzewski, Zivian, & Swanson (1996) conducted a retrospective investigation into the impact of early discharge planning and case management on the length of hospital stay for children with acquired brain injury. They determined that an occupational therapist based coordinated rehabilitation approach decreased the LOS significantly by 17 days. This supports claims that improved coordination can decrease LOS.

With the help of occupational therapy, trauma patients can achieve or regain their highest possible level of independence, occupational therapy helps people make the most of their abilities. When skill and strength cannot be developed or improved, occupational therapy offers creative solutions and resources for carrying out the person's daily activities (Stucky 2001).

Social Workers can provide information about a wide range of community resources. If need be, they can negotiate with others on the person's behalf. The Australian Association of Social Workers (AASW) (2001) state that in all their activities, Social Workers place great emphasis on keeping each client's affairs confidential. Early intervention from social work is important in caring for trauma patients. The social worker provides counselling and support for the patient and family. They also instigate communications with various organisations such as Centrelink for sickness benefits and third party insurance claims. The social worker assists the person to look at the main issues connected with her or his problem and provide a fresh perspective and additional information, and help the person plan effective action (AASW 2001).

6.3 *Complications*

The overall complication rates did not change between the 2 groups. It is interesting to note that in the more elderly group of patients, there was no incidence of complications, however the overall complication rates were low and the sample group was too small for this result to have statistical significance. Thus the statistical power of this study was too low to formally test this difference. In support of this trend, (Perdue et al. 1998) from the US retrospectively reviewed 5,139 adult patients from a Level I trauma center. found that the mortality of the elderly trauma patient (age >65) is twice that in younger patients, despite equivalent severity of injury scores and the rate of in-hospital complications is significantly higher.

The prevalence of preexisting disease was also greater in the elderly. This provides evidence that the trauma case manager should be particularly wary of complication development in the more elderly trauma patient. This is also supported by Tornetta et al. (1999) who reviewed 326 charts of patients older than 60 years who were admitted to one of four Level I trauma centers after sustaining blunt trauma. Mechanisms of injury included in the study were motor vehicle crash, pedestrian struck, fall from a height, and crush injury. They found that mortality can be predicted by injury severity and the complications of pneumonia, sepsis and adult respiratory distress syndrome.

There is a call for more accurate assessments of the quality of medical care, and a specific need for cost effective methods for evaluating trauma patient outcomes for use in quality improvement activities (Trooskin et al. 1999). Holbrook, Hoyt & Anderson (2001) conducted a comprehensive study

investigating the impact of major in hospital complications on the quality of life of trauma patients in San Diego. They demonstrated that major in hospital complications, such as pneumonia, pulmonary embolus, bowel obstruction and wound infection are strongly associated with excess resource utilisation, in addition to higher mortality, longer length of stay and increased costs in trauma patients. Holbrook, Hoyt & Anderson (2001) found that major complications were present in 10.1% of trauma patients. Their results provide confirmation that in-hospital complications have a prolonged impact on functional outcome of trauma patients and quality of life. In a paper reviewing trauma care evaluation methods, Trooskin et al. (1999) state that complications as an outcome measure still remains relatively unevaluated in trauma, despite their importance in the current health care environment that stresses minimising costs and resource utilisation while increasing quality.

TCM can assist in reducing complications and is contributing to the ongoing struggle to improve the quality of care and life of trauma patients whilst decreasing hospital and community resource use.

6.4 Missed injuries

In sharp contrast to the complication results, there was a significant increase in the missed injury detection rate from 0.6% to 5.4% during the study period. The increased rate is consistent with the vigilance that TCM demands. For example this could be due to the TCM ensuring that the tertiary survey was done, which was previously described by Janjua, Sugrue, & Deane (1998) as a comprehensive general physical examination in conjunction with the review of all radiographs and blood tests. In the literature the reported rates of missed

injuries in trauma patients varies from 2 to 50% (Janjua et al, 1998).

According to the staff survey, documentation was also perceived to have improved during the study. Perhaps there may have been 'missed injuries' which were being detected and treated without documentation. Despite this, it remains clear that a statistically significant rise in the detection of missed injury occurred during the TCM trial period.

Patients sustaining blunt trauma (for example a motor vehicle crash) have higher rates of missed injuries than patients sustaining penetrating injuries (for example, a stab wound) (Janjua et al, 1998). This observation is pertinent in Australian hospitals, as the vast majority of trauma patient presentations are blunt in origin. For example at the study institution, blunt injuries account for 95% of trauma presentations.

These injury statistics could have significant impact on medicolegal issues, representation, longer admissions and patient satisfaction. They raise the possibility that patients may have been going home with undetected injuries and taking longer to get back to work and return to their previous functional status. Furthermore, unrecognised injuries may not only have an adverse impact on patient outcomes, but they can also compromise the credibility of both the clinicians and the institution (Janjua et al. 1998)

6.5 *Staff Satisfaction*

Staff satisfaction is one of the most important aspects, and also one of the hardest to analyse quantitatively. Nevertheless, the survey results were extremely encouraging. Staff felt that communication, documentation, coordination and pain management all improved dramatically. Comments from nursing, medical and allied health staff were also greatly encouraging. In an anecdotal discussion on the benefits of teamwork and collaboration Bell (2000) found that team empowerment in conjunction with medical and nursing ownership created a sense of accomplishment amongst all staff providing patient care. In addition, Bell (2001) stated that the promotion of team work and communication improved the likelihood of organisational goal achievement.

The positive trends in the areas of decreased length of stay, missed injury detection, complication rates and staff satisfaction can possibly be explained by TCM providing a general holistic approach towards patient care as well as the high level of resource awareness possessed by the trauma case manager. Additionally, improved communication, coordination and collaboration occurred which aided in easing the burden of busy surgical teams.

6.5.1 General Holistic Approach

Having one person overseeing care and considering all aspects of the patient, rather than a single system contributed to a general holistic approach. This provides continuity and familiarity for the patient and family. The current model of trauma care delivery in Australia does not support this concept. Individual teams are much more task oriented rather than holistically motivated, as

previously exhibited in case study examples. We can learn something from the Canadian and US models of having a dedicated trauma team that follows the patient through from admission to discharge. A significant impact occurred with one nurse specialist coordinating care. If a dedicated trauma team existed the results could be even more outstanding.

As previously discussed, task orientation models of nursing work against comprehensive team-based holistic care. The concept of holistic care is well entrenched in the trauma case management model. Holistic nursing care implies that the nurse considers all aspects of the person, addresses the person as a whole rather than as individual body systems, and includes the family when planning care (Lobo cited in Phipps et al. 1991).

6.5.2 Resource Awareness

Rotating interns, residents and registrars are not aware of the hospital internal system and resources. The TCM assisted in their orientation and education and once again provided a continual service for trauma patients and also staff caring for trauma patients. A survey conducted of new graduate doctors in Ireland found that 91% of respondents felt they did not possess the skills and characteristics required of them as an intern (Hannon 2000). Augmentation and complementing of junior medical staff with relatively little experience in trauma management could also contribute to the trend towards decreased length of stay.

6.5.3 Improved Communication, Coordination and Collaboration

TCM is a system which standardises processes of care and manages the communication and collaboration between patients and health professionals and between the health professionals themselves. In their discussion paper on maintaining professional integrity in the midst of interdisciplinary collaboration Lindeke & Block (1998) highlight the benefits of care provider collaboration to the patient. They also state that collaboration among health care disciplines is well supported as an effective solution to many problems, particularly fragmentation amongst complex patient groups.

Working with others effectively in health care is a challenge. Communication and human relationships with all those involved in the patient's care impact on nursing practice, patient care and how nurses felt about themselves. Lawson (1995) in his paper on provider communication styles in the context of established provider-patient relationships states however, that, there is an absence of empirical studies of nurse-patient relationships that focus on interpersonal communication and its potential effects on patient outcomes. The trauma case manager is required to have excellent communication, collaboration and coordination skills, and it is evident that staff utilising the TCM service agreed that the case managers involved in this pilot study fulfilled these criteria.

6.5.4 Surgical Team time

The surgical teams do not have time available to coordinate and collaborate to the same extent as the TCM. The trauma case manager had time available to focus on the trauma patients, without the competing demands from other patients that the surgical teams would be faced with. It would be interesting to investigate whether TCM has had any impact on the care of other surgical, non trauma patients. Interestingly, Spisso et al. (1990) in their analysis of the impact of the trauma nurse practitioner on the quality of care for trauma patients in a large US institution, found that the introduction of a trauma nurse practitioner reduced the time of surgical house-staff activities such as teaching patients and completing discharge summaries by 352 minutes per day. However the number of house staff surveyed is not mentioned.

6.6 Coding

As mentioned in the results, many errors and omissions were noted for the month of August and September 2000. These 2 months contained 100 trauma patient admissions, and equated to 15% of overall admissions for the year 2000. The high error rate of 74% and AR-DRG alteration rate of 28% is probably due to the complex nature of trauma patients, extensive patient records, poor documentation, multiple procedures and injuries. These causes of error correlate with findings from other Australian authors including Reid et al. (2000) who found that there was considerable variation in the comprehensiveness of coding across Australian states and Donoghue (1991) and Callen et al. (1994) as previously mentioned. The great difference between the error rate and the AR-DRG rate is likely to be a result of the fact that

inclusion of missing codes may have no impact on the AR-DRG. As stated by Reid et al. (2000), it might be argued that these findings weaken the conclusions regarding the importance of detecting coding error. However, a change of AR-DRG for even a modest number of the number of records with missing codes translates into significant improvement in the accuracy of AR-DRG allocation.

The high error rate means that there is potentially $266,400 funding that is not being identified for trauma patients (based on the total number of trauma admissions for the year 2000). This figure is consistent with larger audits, particularly that of Stevens et al (1998) in Western Australia, who reported a loss of nearly $400,000 for each of the 7 hospitals involved in the study.
Hospitals are encouraged to "manage" their elective workload to ensure budget is met, operating with a capped pool of funds for acute inpatients. In order to achieve this, a hospital must be able to accurately identify the true cost to the organisation of the non-elective workload, through the use of AR-DRGs to identify resource usage. If the true cost is not available, the pool of funding available to be used for elective work will be overstated resulting in possible budgetary problems at the end of the period.

As a result of the recommendations of the NSW Health Council (2000), all NSW Area Health Services are required to fund the acute activity component of a hospital's budget using the episode finding approach (Menadue 2000). The introduction of episode funding in NSW will enable managers and clinicians to analyse variations in cost of an episode of care, however this is only valid if coding is accurate (Menadue & Kibble 2000). It is proposed that trauma patient

coding should at the very least be reviewed by an experienced trauma data collector, perhaps in conjunction with an increase in staffing levels be integrated into the role of the trauma coordinator, as is the case in many US institutions. Southard (1994) first suggested this important role for trauma case managers in the summary of her paper discussing strategies for trauma economics.

The implementation of episode funding for patients classified in acute episodes, such as the trauma patient, is placing increased importance on accuracy of patient coding. The validity of coding is dependent on legible, comprehensive and complete documentation. Although to some clinicians, documentation might not be seen to be of high priority in an acute patient episode, it can severely impact the funding of the hospital. Inappropriate funding will affect resource allocation and potentially the ability to deliver quality patient care.

7 – Summary

Nurses are in an occupation that has interpersonal communication at it's core. Several vital issues, encompassing many aspects of communication, collaboration, coordination and resources were raised by the nursing staff in focus groups which led to the development of a staff satisfaction survey. The nursing case management role benefits nursing by further developing the profession. As a result of focus group data and an identified need for change of practice, a trial of a trauma case management model was undertaken. This trial was part of a determined effort to improve communication between caregivers and coordination of trauma patient care, and as a result improve the flow and quality of care of trauma patients.

This pilot study has shown that TCM significantly improves Allied Health utilisation and increases the detection of missed injuries. TCM improves staff satisfaction, communication and medical record documentation. Some of the benefits of TCM may be difficult to quantify on a cost-benefit level, such as improved teamwork, coordination, staff morale and patient satisfaction. This pilot study prepares the ground for a more detailed analysis of the role of the trauma case manager and of the impact of TCM on quality patient outcomes, and resource use, such as clinical coding.

The implementation of episode funding for patients classified in acute episodes, such as the trauma patient, is placing increased importance on accuracy of patient coding. The validity of coding is dependent on legible, comprehensive

and complete documentation. Although to some clinicians documentation might not be seen to be of high priority in an acute patient episode, it can severely impact the funding of the hospital. Inappropriate funding will affect resource allocation and potentially the ability to deliver quality patient care. The use of nurse case managers will not only benefit coding accuracy, and funding opportunity, but improve coordination and the quality of patient care.

Communication and human relationships with all those involved in care delivery impact on practice and patient care. The trauma case manager requires excellent communication, collaboration and coordination skills. Having one person overseeing care and looking at all aspects of the patient, not just a single system contributed to a general holistic approach. TCM also provided continuity and familiarity for the patient and family. A significant impact occurred with one nurse specialist coordinating care, if a dedicated multidisciplinary trauma team existed the results could be even more outstanding.

8 - Limitations and Recommendations

8.1 Limitations of Focus Group research

It is acknowledged that if one is going to use the data obtained from focus groups to create a survey, then each subject group for which the survey is intended should be involved in a focus group. These focus groups reflect the group perspective of nursing staff caring for trauma patients. The nurses interviewed have particular opinions and processes unique to their experiences in caring for trauma patients, that have developed over time. In light of the previous discussion concerning organisational behaviour and the nurse-doctor relationship it would have been pertinent to conduct focus groups with doctors and allied health staff. However, smaller numbers and limited availability of these staff members restricted opportunity to engage them as a group for an extended period of time. To overcome this, informal meetings with senior medical and allied health staff were held, in which they identified many of the same themes mentioned in the discussion of the focus groups.

8.2 Limitations of the TCM Pilot Study

The relatively small sample sizes and non-availability of TCM cover on weekends and after hours prevented the full potential of TCM being explored. In addition, some of the benefits of TCM were difficult to measure accurately, such as improved quality of care, teamwork and collaborative effort. The LOS may not be the single most conducive outcome measure to fully evaluate TCM's true benefit.

8.3 Recommendations

This study supports 4 recommendations:

1. The Extension of TCM for all trauma patients. This can be achieved by increasing the staffing level to provide cover for 16 hours on weekdays and 8 hours on weekend. The annual cost will be $90,000 per year (see Appendix 4).
2. An increased variety of outcome measures needs to be utilised.
3. The development of a multidisciplinary team to care for all trauma admissions consisting of surgeons, trauma case manager, physiotherapist, occupational therapist and social worker.
4. The need for measures of quality of care to focus on both the processes and outcomes of care, so that the processes can be related to the outcomes. Less is known about which processes lead to which outcomes.

8.4 Expected benefits

The expected benefits of the implementation of TCM are:

1. Reduced length of stay for trauma admissions.
2. An increase in casemix funding as a result of more accurate diagnostic coding for all trauma admissions. This will enable improved budget management and funding allocation
3. Further research into the outcome of a full scale implementation of TCM.
4. Augmentation of ED staffing in the initial management of trauma patients. This will allow better coordination and continuity of care for such patients during busy periods and improved adherence to protocol from the beginning of the admission.
5. An increased education role of the trauma case manager throughout the hospital, both formal and bedside.

8.5 Opportunity

Opportunities for further research include a larger and more comprehensive study of all trauma admissions to a tertiary trauma centre, incorporating extensive TCM coverage including after hours, 7 days per week.

It is important to calculate prospectively to gain a suitable sample size that is clinically relevant. du V Florey (1993), a medical statistician expands on this concept stating that there needs to be evidence that a study is of adequate size to exhibit that there is a reasonable chance of a clear answer at the end of the trial. According to Altman (1980) who has published extensively in the area of medical statistics, the power of a significance test means how likely it is that we will detect a difference of clinical importance that exists. The significance is a statement on how likely it is that the observed difference is due to chance when the true difference is zero.

To demonstrate a statistically significant two-day reduction in LOS the study would have needed to enrol 250 patients in each limb of the study. This is based on Altman's power analysis model using α of 0.05 and β of 0.2. Methods used to gain the number of patients is demonstrated in Appendix 5.

8.6 Addendum

Since the completion of this thesis, funding has been granted by the study institution to employ a further 1.4 FTE trauma case managers. It is anticipated that the case managers will be orientated to the role in January 2002 and commence implementing trauma case management for all trauma patient admissions by March 2002.

References

3M Health Care. 3M Coding and Grouping Application, ICD-10-AM and ICD-9-CM User's Guide. cin-010: A 7/98. 1998. Sydney, 3M Australia Pty Ltd.

AASW, Australian Association of Social Work (2001). La Trobe Social Work Career page. http://www.latrobe.edu.au/www/socialwork/swkcareer.html.

Acute Health Division, Department of Health Services Victoria (1999). Review of Trauma and Emergency Services 1998: Final Report - the scale of the trauma problem. Department of Human Services.

http://www.dhs.vic.gov.au/ahs/trauma2/index.htm , 1-4. 1999. State Government of Victoria. <6-11-2001>.

Adams A. & Bond S. 1995, *Nursing organisation in acute care: the development of scales*, Centre for Health Services Research, University of Newcastle upon Tyne, Newcastle upon Tyne, p71.

Adams A., Bond S., & Hale C. 1998, "Nursing, organisational practice and its relationship with other features of ward organisation and job satisfaction", *Journal of Advanced Nursing*, vol. 27, no. 6, pp. 1212-1222.

Agar M. & McDonald J. 1995, "Focus Groups and ethnography", *Human Organisation*, vol. 54, no. 1, pp. 78-86.

Allred C., Arford P., Michel Y., Dring R. C., V, & Veitch J. 1995, "A Cost-Effectiveness Analysis of Acute Care Case Management Outcomes", *Nursing Economics*, vol. 13, no. 3, pp. 129-136.

Altman DG 1980, "Statistics and ethics in medical research", *BMJ*, vol. 281, pp. 1336-1338.

Amos B. 2000, "Australia's health system in the 20th century", *Health Cover*, vol. 10, no. 5, pp. 59-63.

APA, American Physiotherapy Association (2001). How physiotherapy helps. http://www.physiotherapy.asn.au/Aboutphysio/how_physiotherapy_helps.htm . <06.11.2001>

Arnold E & Boggs K (Eds), 1995 *Interpersonal relationships*, WB Saunders, Philadelphia.

Australian Bureau of Statistics. Australian Social Trends 1996. Transport - Special features: Motor vehicle traffic accidents. ABS. http://www.abs.gov.au/ausstats/abs@.nsf/0/F59FA8B95AE20D62CA256AD500063440?Open&Highlight=0,Injury,cost,death , 1-8. 1996. Commonwealth of Australia. 6-11-2001.

Australian Bureau of Statistics (1998). Health - Injuries and deaths due to external causes. AusStats. http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/NT000176DE , 1-3.

Commonwealth of Australia. 6-11-2001.

Bell RM & Krantz BE 2000, "Initial Assessment," in *Trauma*, 4 edn, Mattox et al, ed., McGraw Hill, New York, pp. 153-170.

Bell H. 2000, "Shared Governance and team work", *AORN*, vol. 71, no. 3, pp. 631-635.

Benner P 1984, *From novice to expert* Addison-Wesley, Menlo Park, Ca.

Berger, E. 2000, "Capitation in California: Not the final phase; just the beginning", *Healthcover*, vol. April, pp. 51-60.

Beyea S. & Nicoll L. 2000a, "Collecting, analysing, and interpreting focus group data", *AORN Journal*, vol. 71, no. 6, pp. 1278-1283.

Beyea S. & Nicoll L. 2000b, "Learn more using focus groups", *AORN Journal*, vol. 71, no. 4, pp. 897-900.

Bhojani S. 2000, "What are the real issues in 'managed care'", 5 edn, Health Cover, Sydney, pp. 24-30.

Bradshaw A. 1995, "What are nurses doing to patients? A review of theories of nursing past and present", *Journal of Clinical Nursing*, vol. 4, no. 2, pp. 81-82.

Brereton M. 1995, "Communication in Nursing: In theory and practice", *Journal of Advanced Nursing*, vol. 21, no. 2, pp. 314-324.

Brockopp D., Porter, M., Kinnaird, S., & Silberman, S. 1992, "Fiscal and Clinical Evaluation of Patient Care: A Case Management Model for the Future", *Journal of Nursing Administration*, vol. 22, no. 9, pp. 23-27.

Burns T., Creed F., Fahy T., Thompson, S., Tyrer, P., & White, I. 1999, "Intensive versus standard case management for the severe psychotic illness: a randomised trial", *The Lancet*, vol. 353, no. 9171, pp. 2185-2189.

Campbell A., Vittinghoff E., Morabito D., Paine P., Shagoury C., Praetz P., Grey D., McAninch J., & Schecter W. 1995, "Trauma centres in a managed care environment", *The Journal of Trauma: injury, infection and critical care*, vol. 39, no. 2, pp. 246-253.

Campbell B. & Hill M. "Clinical mapping for trauma patients: myth or reality? Overhead notes from the International Trauma Conference, Washington D.C.".

Callen J, McDonald J & Sekel R "Clinician Coding Study", Health Information Management Association of Australia Ltd, North Ryde, pp 117-123.

Callen J, Meehan J & Tomornsak S 1997, "Looking for CQI for improvements in clinical documentation and coding", *Health Information Management*, vol 27, no 1, pp 7-11.

Canadian Nurses Association. The scope of nursing practice - a review of issues and trends October 1993. Canadian Nurses Association. www.cna-nurses.ca/pages/resources/scope_of_nursing_practice.PDF+task+oriented+vs+holistic+nursing+models&hl=en , 1-63. 2001. Canadian Nurses Association. <7-11-2001>.

Case Management Society of Australia (2001). Case Management Definition. http://www.cmsa.org.au/definition.html. 5-12-2001.

Chen Z., Lin Y., & Dai Y. The problems of family caregiving among discharged patients in first month. Nursing Research (China) 7[5], 423-34. 1999.

Clapp C. 2000, "Paediatric Care Management in a Managed Care Environment. Determining the Cost of Care Coordination", *Nursing Case Management*, vol. 5, no. 4, pp. 130-140.

Commonwealth Department of Health and Aged Care (1998). Australian Refined Diagnosis Related Groups, Definitions Manual. 4.1. ACT, Commonwealth Government of Australia.

Cowell V. 1995, "Trauma 24-hour observation critical path. Abstract presented at the 1995 American Trauma Society Annual Meeting.", *Traumagram*, vol. 20, no. 4, p. 9.

Crisp J. & O'Brien L. 2001, Report to Committee of Delegates, Peak Forum on Skill Mix and Models of Care 1.

Dean D. Fourth Annual All Stars Health Roundtable: How to Improve Clinical Governance. Chief Executives. 2001. 11-5-2001.
Ref Type: Personal Communication

Donoghue M 1991, "The prevalence and cost of documentation and coding errors", *Australian Medical Record Journal*, vol 22, no 3, pp 91-97.

du V Florey C 1993, "Sample size for beginners", *BMJ*, vol. 306, pp. 1181-1184.

Duckett S. 1996, "The new market in health care: Prospects for managed care in Australia", *Australian Health Review*, vol. 19, no. 2, pp. 10-30.

Duckett S. 1997, *Health Care in the US: What Lessons for Australia*, 1 edn, Australian Centre for American Studies, Sydney.

Eager K. & Harvey R. 2001, "Australia not ready to implement 'best practice' health financing model", *Health Cover*, vol. 10, no. 6, pp. 52-56.

Eccles M. 2000, "Getting evidence into practice", 9 edn, The joint commission on Accreditation of Health Care Organisations, pp. 556-557.

Ellis J. 2000, "Sharing the evidence: clinical practice benchmarking to improve continuously the quality of care", *Journal of Advanced Nursing*, vol. 32, no. 1, pp. 215-225.

Ellis R. 1995, "Defining Communication," in *Interpersonal communication in nursing*, 1 edn, Ellis RB, Gates RJ, & Kenworthy N, eds., Churchill Livingstone, Edinburgh, pp. 3-16.

Emergency Nurses Association 1999, *Trauma Case Management: Implementation and outcome evaluation.*, 1 edn, American Heritage, New York.

Erlen J. & Sereika S. 1997, "Critical care nurses, ethical decision-making and stress", *Journal of Advanced Nursing*, vol. 26, pp. 953-961.

Esposito B 1998, "Nursing Assessment and Resuscitation," in *A Comprehensive Curriculum for Trauma Nursing*, 2 edn, Bayley EW & Turcke SA, eds., Roadrunner Press., Park Ridge, Illinois., pp. 305-308.

Fagin C. 1992, "Collaboration between nurses and physicians: no longer a choice.", *Nursing Health Care*, vol. 13, pp. 354-363.

Fels A. 2000, "ACCC discusses conduct unbecoming - and conduct not so unbecoming", *Healthcover*, vol. 10, no. 5, pp. 24-30.

Fernandez C. 1995, " Trauma Case Management of the multiply injured patient: a case study", *Journal of trauma nursing*, vol. 2, no. 4, pp. 102-104.

Fisher A. 1999, "Registered nurse turnover", *Journal of Emergency Nursing*, vol. 25, no. 4, p. 312.

FitzPatrick K. Trauma Patient Length of stay at the Hospital of the University of Pennsylvania. 20.FitzPatrick, K.2001 Personal Correspondence .Trauma Program Manager, Hospital of the University of Pennsylvania , Division of Traumatolgy & Surgical Critical Care, 3400 Spruce Street - 2nd Flr Dulles Bldg, Philadelphia, PA 19104.USA . 2001. Ref Type: Internet Communication

Flanagan T. & Green S. 2000, "The concept of maintenance physiotherapy", *Australian Journal of Physiotherapy*, vol. 46, pp. 271-278.

Flynn M. 1991, "Product-line management: Threat or opportunity for nursing?", *Nursing Administration Quarterly*, vol. 15, no. 2, pp. 21-32.

Gaedeke Norris M. & Hill C. 1991, "The Clinical Nurse Specialist: Developing the Case Manager Role", *Dimensions of Critical Care Nursing*, vol. 10, no. 6, pp. 346-353.

Gibb H & Banfield M. 1996, "The issue of critical paths in Australia: where are they taking us?" *Nursing Inquiry,* vol 3, no. 1,pp 36-44.

Girard N. 1994, "The Case Management model of Patient Care Delivery", *AORN Journal*, vol. 60, no. 3, pp. 403-415.

Gross P. 2000, "Implementing Evidence-Based Recommendations for Health Care", *Journal on Quality Improvement*, vol. 26, no. 9, pp. 547-553.

Griffiths R & Hindle D. 1999, “The effectiveness of AN-DRG's in classification of acute admitted patients with diabetes”, *Health Information Management*, vol. 29, no. 2, pp. 77-83

Grove P., Curtis K., & Garnam T. St George Hospital Trauma Service Data Base. 2001. Ref Type: Unpublished Work

Hale C. 1995, "Research Issues in Case Management", *Nursing Standard*, vol. 9, no. 44, pp. 29-32.

Hannon F. 2000, "A national medical education needs assessment of interns and the development of an intern education training programme", *Medical Education*, vol. 34, no. 4, pp. 275-284.

Harrahill M. & Eastes L. 1999, " Trauma Nurse Practitioner: The Perfect Job?", *Journal of Emergency Nursing*, vol. 25, no. 4, pp. 337-338.

Heenan A. 1991, "Uneasy partnership", *Nursing Times*, vol. 87, no. 10, pp. 25-27.

Hickie J 1994, "The challenge for clinicians", 1 edn, Commonwealth Department of Human Services and Health, pp 5-8.

Holbrook TL, Hoyt DB, & Anderson JP 2001, "The impact of Major In-Hospital Complications on Functional Outcome and Quality of Life after Trauma", *Journal of Trauma Injury, Infection and Critical Care*, vol. 50, no. 1, pp. 91-95.

Holman J 1994, "Coders and Clinicians: A two-way street to understanding", 1 edn, Commonwealth Department of Human Services and Health, Hobart, pp 105-108.

Hsia DC, Rushat WM, Fagan AB, Tebbutt JA, & Kusserow RP 1988, "Accuracy of diagnostic coding for Medicare patients under the prospective-payment system", *New England Journal of Medicine*, vol 318, no 6, pp 352-355.

Huttner C. 1990, "Strategies for recruitment and retention of critical care nurses: a cardiovascular program experience", *Heart & Lung*, vol. 19, no. 3, pp. 230-236.

Institute for International Health. Injury Prevention and Trauma Care. Institute for International Health. http://www.iih.usyd.edu.au/text/about/about.html , 1-2. 2001. <6-11-2001>.

Janjua KJ, Sugrue M., & Deane S 1998, "Prospective Evaluation of Early Missed Injuries and the Role of Tertiary Trauma Survey." *Journal of Trauma*, vol. 44, no. 6, pp. 1000-1007.

King IM. 1981, *A Theory for Nursing Concepts, Process and Systems.* New York, John Wiley & Sons.

King M. 1990, "Clinical Nurse Specialist collaboration with physicians", *Clinical Nurse Specialist*, vol. 4, pp 172-6

Knies R. 1999, "Short Staffing", *Journal of Emergency Nursing*, vol. 25, no. 4, p. 263.

Kozier B, Erb G, Berman AB, & Burke K 2000, "Nursing Theories and Conceptual Frameworks," in *Fundamentals of Nursing*, 6 edn, Kozier B et al., eds., Prentice Hall, New Jersey, pp. 44-49.

Latini E. 1996, "Trauma critical pathways: a care delivery system that works." *Critical Care Nursing Quarterly*. vol. 19, no. 1, pp 83-7.

Lawson M. 1995, Provider communication styles in the context of established provider-patient relationships: patients' perceived autonomy support and satisfaction with the relationship, PhD, University of Rochester School of Nursing.

Lenehan G. 1999, "Editorial", *Journal of Emergency Nursing*, vol. 25, no. 2, pp. 77-78.

Lindeke L. & Block D. 1998, "Maintaining Professional Integrity in the Midst of Interdisciplinary Collaboration", *Nursing Outlook*, vol. 46, pp. 213-218.

Lobo ML 1991, "Nursing Care of Ill Adults: Theoretic Perspectives," in *Medical Surgical Nursing*, 4 edn, Phipps WJ et al., eds., Mosby, St Louis, pp. 33-39.

Lochman, J. 1983, "Factors related to patients satisfaction with their medical care", *Journal of Community Health*, vol. 9, no. 2, pp. 91-109.

MacKenzie & Fowler 2000, "Epidemiology of Trauma," in *Trauma*, 4 edn, Mattox et al, ed., McGraw Hill, New York, pp. 21-40.

Mattox KL, Feliciano DV & Moore EE (Eds) 2000, *Trauma* 4Ed, McGraw Hill, New York.

Menadue J. 2000, "Reforms in NSW to include casemix, three year budgets and a metropolitan plan.", *Healthcover*, vol. 10, no. 5 April May, pp. 11-14.

Menadue J. & Kibble, G. 2000, Report of the NSW Health Council - a better health system for NSW, NSW Government, Gladesville, 1.

Meyer G. 2000, "Review of findings from AHCPR", *Journal on Quality Improvement*, vol. 26, no. 9, pp. 551-552.

Millar B., Maggs C., Warner V., & Whale Z. 1996, "Creating consensus about nursing outcomes 2. Nursing outcomes as agreed by patients, nurses and other health professionals", *Journal of Clinical Nursing*, vol. 5, no. 4, pp. 263-267.

Miller T. & Levy D. 1995, "The effect of regional trauma care systems on cost", *Archives of Surgery*, vol. 130, pp. 188-193.

Misinki M, Thompson GK, Talley JA, Lucich S, & Johnson R 1993, "Model for trauma outcomes management in patients with multiple trauma", *Critical Care*

Nursing Clinics of North America, vol. 5, no. 4, pp. 741-755.

Moody-Williams J., Athey J., Barlow B., Blanton D., Garrison H., Mickalide A., Miller T., Olsen L., & Skripak D. 2000, "Injury prevention and Emergency Medical Services in a Managed Care Environment", *Annal of Emergency Medicine*, vol. 35, no. 3, pp. 245-251.

Moores Y 1992, "Setting new boundaries.", *Nursing Times*, vol. 88, no. 37, pp. 29-32.

NCCH - National Centre for Classification in Health (2000). The International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM). Faculty of Health Sciences, University of Sydney. www.cchs.usyd.edu.au/ncch/ 1-5[10]. 2000. Australian Print Group.

NSW Health. Final Draft NSW Emergency Department Episode Funding Guidelines for Area Health Services. 2001a. NSW Health. Service Category Definitions. www.internal.health.nsw.gov.au/iasd/dm/isc/index.html . 2001b. NSW Health.

NSW Health Council. March 2000, *Report of the NSW Health Council – A better health system for NSW, NSW Government*, Better Health Centre – Publications Warehouse, Gladesville.

O'Connor P. 1994, "Examination of the impact of a casemix based payment system on reimbursement for road injury admissions", 1 edn, Commonwealth Department of Human Services and Health, p. 77.

O'Mara A. 1995, "Communicating with other health care professionals," in *Interpersonal relationships*, Arnold E & Boggs K, eds., WB Saunders, Philadelphia.

Olivas G., Togno-Armanasco V., Erickson J., & Harter S. 1989, "Case Management: A Bottom-Line Care Delivery Model. Part 1: THe Concept", *Journal of Nursing Administration*, vol. 19, no. 11, pp. 16-20.

Orem D. 1980, *Nursing: Concepts of Practice,* 2edn, McGraw-Hill, New York

Orem D. 1985, *Nursing: Concepts of Practice* , 3 edn, McGraw-Hill, New York.

Palmersheim T., Eccles MP, & Bisognano M. 2000, "The 2000 ICSI/IHI Colloquium on Clinical Quality Improvement: "Cultivating Quality-Growing and Nurturing Clinical Quality Improvement in Health Care"", *Journal on Quality Improvement*, vol. 26, no. 9, pp. 554-558.

Panacek EA (2000) "Designing and Performing Cohort Studies" *Lecture notes from the University of California-Davis Medical Center SAEM meeting syllabus: May, 2000* http://www.saem.org/download/panacek2.pdf <21.06.2002>.

Peacock S & Segal L 2000, "Capitation funding in Australia: imperatives and impediments". *Health Care Management Science*, vol. 3, no. 2, pp77-88.

Perdue PW, Watts DD, Kaufmann CR, & Trask AL 1998, "Differences in Mortality between elderly and younger adult trauma patients: Geriatric status increases risk of delayed death", *Journal of Trauma Injury, Infection and Critical Care*, vol. 45, no. 4, pp. 805-810.

Perry C, Kearsey I, Williamson D & Roberts R, "Performance Indicators for Coding Quality Conference" *Proceeding 19th Conference for Health Information Management Health Information Management Association of Australia LTD* North Ryde pp 99-107

Perry L. 1997, "Critical incidents, crucial issues: insights into the working lives of registered nurses.", *Journal of Clinical Nursing*, vol. 6, no. 2, pp. 131-137.

Petryshen P. & Petryshen P. 1992, "The Case Management Model: an innovative approach to the delivery of patient care", *Journal of Advanced Nursing*, vol. 17, pp. 1188-1194.

Petzal S., Selvarajah C., & Willis Q. 1992, *Management; A behavioural approach*, 1 edn, Longman Cheshire, Melbourne.

Phipps WJ, Long BC, Woods NF & Cassmeyer VL. 1991, *Medical Surgical Nursing,* 4Ed, Mosby, St Louis.

Pickersgill F. 1998, "Raising the standard", *Nursing Standard*, vol. 12, no. 44, pp. 22-23.

Pierce G. 2000, "Future directions in Canada's Medicare", *Healthcover*, vol. April, pp. 45-52.

Pierog L. 1991, "Case management: a product line", *Nursing Administration Quarterly*, vol. 15, no. 2, pp. 16-20.

Porrit L. 1991, Interaction strategies, an introduction for health professionals., 2 edn, Churchill Livingstone, Melbourne.

Queensland Nurses Union. Nursing vs Care Models. Queensland Nurses Union. www.qnu.org.au/nursingcare.htm , 1-4. 2001. 6-11-2001.
Ref Type: Electronic Citation.

Reed J. & Payton V. 1997, "Focus groups: issues of analysis and interpretation", *Journal of Advanced Nursing*, vol. 26, no. 4, pp. 765-771.

Reid B, Palmer G & Aisbett C 2000, "Under-coding in Australia limits the performance of DRG groupers" *Health Information Management* 29, no. 3, pp 113-7.

Reilly R & Perrin C (1999). Preparing the nursing profession: Educating to lead or training to be manageable? Australian Electronic Journal of Nursing. http://www.scu.edu.au/schools/nhcp/aejne/archive/vol4-2/reillyrvol4_2.htm 4[2], 1-7. 1999. Department of Nursing, University of Southern Queensland. 7-11-2001.

Roberts P. 1997, "Planning and running a focus group", *Nursing Research*, vol. 4, no. 4, pp. 78-82.

Roberts R., Innes KC & Walker SM 1998, "Introducing ICD-10-AM in Australian hospitals", *Medical Journal of Australia*, vol. 169, no. Supplement, pp. 32-35.

Robinson N. 1999, "The use of focus group methodology - with selected examples from sexual health research", *Journal of Advanced Nursing*, vol. 29, no. 4, pp. 905-913.

Rosen R. 2000, "Improving quality in the changing world of quality care", *British Medical Journal*, vol. 321, no. 7260, pp. 551-554.

Sakzewski L., Zivian J., & Swanson C. 1996, "Impact of early discharge planning and case management in length of hospital stay for children with acquired brain injury", *Australian Occupational Therapy Journal*, vol. 43, pp. 105-112.

Schiavenatom M. VSU College of Nursing Florence Nightingale page. Schiavenato M. www.valdosta.edu/nursing/hisotry_theory/florence , 1-4. 2001. Valdosta College of Nursing. 6-11-2001.

Schoenbaum S. 2000, "Implementation: It's the Way Care Is Organised that Counts", *Journal on Quality Improvement*, vol. 26, no. 9, pp. 550-551.

Scott J. 1997, "Clinical pathways in Australia: current issues and future challenges", *Contemporary Nurse*, vol. 6, no. 1, pp. 2-4.

Scotton D. 1995, "Managed competition: issues for Australia", *Australian Health Review*, vol. 18, no. 1, pp. 1-25.

Sesperez J., Wilson S., Jalaludin B., Seger M., & Sugrue M. 2001, "Trauma Case Management and Clinical Pathways: Prospective Evaluation of their effect on selected patient outcomes in five key trauma conditions", *J,* vol.15, n. 4, pp643-649", *Journal of Trauma Injury, Infection and Critical Care*, vol. 15, no. 4, pp. 643-649.

Shagoury C. Trauma patient Length of Stay at San Fransisco General Hospital,California,USA. Curtis, K. 2000. Ref Type: Internet Communication.

Sim J. 1998, "Collecting and analysing qualitative data: issues raised by the focus group", *Journal of Advanced Nursing*, vol. 28, no. 2, pp. 345-352.

Sim J. & Snell J. 1996, "Focus groups in physiotherapy evaluation and research", *Physiotherapy*, vol. 82, pp. 189-198.

Sona C 1993, "The clinical advancement model: Filling in the gaps", *American Journal of Nursing*, vol. 52, no. 9, p. Supplement.

Southard P. 1994, "Trauma center challenge: Survival in a managed care market.", *Journal of Emergency Nursing*, vol. 20, no. 2, pp. 162-163.

Sovie M. 1987, "Exceptional Executive LEedership Shapes Nursing's Future", *Nursing Economics*, vol. 5, no. 1, pp. 13-20.

Spain D., McIlvoy L., Fix S., Boaz P., Catillo E., Harping J., Raque G., & Miller F. 1998, "Effect of a clinical pathway for severe traumatic brain injury on resource utilisation. 45(1), 101-5.", *The Journal of Trauma: injury, infection and critical care*, vol. 45, no. 1, pp. 101-105.

Spisso J., O'Callaghan C., McKennan M., & Holcroft J. 1990, "Improved quality of care and reduction of housestaff workload using trauma nurse practitioners", *The Journal of Trauma: injury, infection and critical care*, vol. 30, no. 6, pp. 660-665.

Stevens S, Unwin CE, & Codde JP 1998, "A review of hospital medical record audits: implications for funding and training", *Australian Health Review*, vol 21, no 3, pp 78-91

Stucky A (2001). About occupational therapy. http://physicaltherapy.about.com/health/physicaltherapy/library/weekly/aa112199.htm . 2001.

Sutton K. 1999, "Registered nurse turnover", *Journal of Emergency Nursing*, vol. 25, no. 4, p. 313.

Sweet S. & Norman I. 1995, "The nurse-doctor relationship: a selective literature review", *Journal of Advanced Nursing*, vol. 22, no. 1, pp. 165-170.

Tornetta P, Mostafavi H, Riina J, Turen C, Reimer B, Levine R, Behrens F, Geller J, Ritter C, & Homel P 1999, "Morbidity and mortality in elderly trauma

patients", *Journal of Trauma Injury, Infection and Critical Care*, vol. 46, no. 4, pp. 702-6.

Trauma Systems Advisory Committee of NSW. Minutes from the trauma systems advisory committee. 2000. 8-6-2000.
Ref Type: Personal Communication

Tritsch JM, 1998, "Application of King's theory of goal attainment and the Carondelet St. Mary's case management model", *Nursing Science Quartely*. vol. 11 no. 2, pp 69-73.

Trooskin S., Copes W., Bain L., & Santora TA 1999, "Case-matching methodology as an adjunct to trauma performance improvement for evaluating lengths of stay and complications", *Journal of Trauma Injury, Infection and Critical Care*, vol. 47, no. 6, pp. 1018-1027.

Uzych L. 1996, "Health outcomes in Australia and the United States", *Australian New Zealand Journal of Medicine*, vol. 26, p. 416.

Warner A. 1999 Towards Clinical Governance, draft. South East Health.
Ref Type: Unpublished Work.

Waterman H., Waters K., & Awenat Y. 1996, "The introduction of case management on a rehabilitation floor", *Journal of Advanced Nursing*, vol. 24, no. 5, pp. 960-967.

Wolfgang A. 1988, "The health professions stress inventory", *Psychological Reports*, vol. 62, pp. 220-222.

Woodward A. & Wilson S. 1994, "Managed competition in the British NHS", *The Medical Journal of Australia*, vol. 160, no. 18, pp. 465-467.

Zander K. 1988, "Nursing Case Management: Strategic Management of Cost and Quality Outcomes", *Journal of Nursing Administration*, vol. 18, no. 5, pp. 23-30.

Zander K. & Etheridge, M. 1989, *Collaborative Care: Nursing Case Management* American Hospital Publishing, Chicago.

Zerull L. 2000, "Hospital group saves money with data on nurse case management", *Healthcare Benchmarks*, vol. September, pp. 97-100.

Appendices

Appendix 1: Trauma data base entry criteria

TRAUMA TRIAGE / ACTIVATION CRITERIA
History / Mechanism of Injury : Motor Vehicle Collision at speed > 60 kph Pedal Cyclist struck by motor vehicle at > 30 kph Adult pedestrian struck by motor vehicle at > 30 kph Child pedestrian struck by motor vehicle at **any** speed Fall greater than five (5) metres Patients presenting via the Ambulance Service executing Protocol 4 (ie. bypassing another hospital) Vital Signs : Shallow or retractive breathing Cyanosis or oxygen saturation < 90% Skin pallor or delayed capillary refill Systolic blood pressure < 90mmHg (if age > 5 years) or < 80 + {2 x age in years} for children Heart rate < 50 or > 130 beats per minute Decreased level of consciousness or fitting Pupil(s) dilated or unreactive Injuries : Injury to two or more body regions (ie. hand, neck, chest, abdomen, pelvis, back or long bones) Fracture of two or more long bones spinal cord injury (actual or suspected) Crush injury or amputation of limb Penetrating injury to head, neck, chest, abdomen, groin or back Facial and / or airway burns Burns > 15% in adults Burns > 10% in children

Appendix 2: Staff Satisfaction Survey Pre TCM

Research Study Into The Levels Of Stress And Satisfaction Of Nursing And Medical Staff Caring For Trauma Patients.

INFORMATION TO PARTICIPANTS

You are invited to take part in a research study into trauma care within St George Hospital. The objectives are to investigate issues such as communication, knowledge, stress and documentation. The study is being conducted by Kate Curtis, Trauma Coordinator, St George Hospital as an assessment of staff satisfaction with trauma care. It is also part of Kate Curtis' Masters(hons) program and is being supervised by Dr John Sibbald, University of Wollongong.

All aspects of the study, including the results, will be strictly confidential and only the investigators named above will have access to the information on participants. A report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. We intend that this research study is to further medical and nursing knowledge and may improve the understanding of trauma care.

Participation in this study is entirely voluntary: you are in no way obliged to participate and if you do participate – you can withdraw at any time. Whatever your decision, please be assured that it will not affect your relationship with the hospital or the staff. We would like to repeat the questionnaire in 6 months time.

When you read this information Kate Curtis will, if you wish, discuss this further with you and answer any questions you may have. If you would like to know more at this stage, please feel free to contact Kate Curtis on 9350-1111, #019 or by e-mail curtisk@sesahs.nsw.gov.au

The Ethics Committee of St George Hospital has approved this study

PLEASE RETURN COMPLETED FORM TO YOUR WARD NUM OR TO KATE CURTIS, TRAUMA SERVICE.

PART A.

Below are some work situations. Please indicate on the following scale by ticking (✓) the appropriate box, how often you have found each of the following situations stressful.

1. Having so much work to do that everything cannot be done well.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

2. Experiencing conflicts with supervisors and or administrators.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

3. Feeling ultimately responsible for patient outcomes.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

4. Not receiving the respect or recognition that you deserve from the general public.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

5. Being unsure about what to tell a patient or family about the patent's condition and /or treatment.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

6. Caring for the emotional needs of patients.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

7. Disagreeing with other health professionals concerning the treatment of a patient.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

8. Not having opportunities to share feelings and experiences with colleagues.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

9. Experiencing conflicts with co-workers.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

10. Having job duties which conflict with family responsibilities.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

11. Allowing personal feelings/emotions to interfere with the care of the patient.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

12. Keeping up with new developments in order to maintain professional competence.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

13. Feeling that opportunities for advancement on the job are poor.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

14. Trying to meet society's expectations for high quality medical care.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

15. Supervising the performance of co-workers.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

16. Dealing with 'difficult' patients.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

17. Not being recognised as a true health professional by other health professionals.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

18. Being inadequately prepared in knowledge or skill to meet the needs of patients.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

19. Possessing inadequate information regarding a patent's medical condition.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

20. Not receiving adequate feedback on your job performance.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

21. Not having enough staff to adequately provide necessary services.

Never	Rarely	Occasionally	Often	Very Often
☐	☐	☐	☐	☐

22. Having non-health professionals determine the way you must practice your profession.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

23. Not knowing what type of job performance is expected.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

24. Being interrupted by phone calls or people while performing job duties.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

25. Not being allowed to participate in making decisions about your job.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

26. Not being challenged by your work.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

27. Feeling that you are inadequately paid as a health professional.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

28. Caring for seriously ill patients.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

29. Not being able to use your abilities to the fullest extent on the job.

Never Rarely Occasionally Often Very Often

☐ ☐ ☐ ☐ ☐

30. Fearing that a mistake will be made in the treatment of a patient.

PART B

Below are some statements about caring for trauma patients. Please indicate by ticking (✓) the appropriate box your agreement or disagreement with each statement

1. Patient discharge is often delayed because of a lack of communication.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

2. Communication between medical teams caring for the trauma patient is good.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

3. It is always easy to contact the trauma patient's team.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

4. The management plan for the trauma patient is very difficult to ascertain.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

5. Medical teams are in agreement as to who has overall responsibility for care of the trauma patient.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
☐	☐	☐	☐	☐

6. It is hard to care for the multitrauma patient because of poor communication between teams.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

7. Good communication between care providers is essential in providing high quality care.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

8. Review of the trauma patient by the appropriate team is often difficult.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

9. I am hesitant to call a more senior staff member regarding patient management

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

10. Patient discharge is delayed because of incomplete documentation.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

11. Information documented about the care of trauma patients is adequate.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

12. By reading the patient notes I will have a clear understanding of the plan of care.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

13. Pain management is always adequate in the trauma patient.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

14. Equipment for the care of the trauma patients is readily available.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

15. I always know which medical team to contact about the care of the trauma patient.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

16. When caring for a trauma patient I am confident.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

17. The skill mix of nursing staff is almost always adequate.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

18. The number of nursing staff available to care for the trauma patient is adequate

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

19. Workload is increased by having inexperienced nursing staff.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

20. Workload is increased by having inexperienced medical staff.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

21. The number of medical staff available to care for the trauma patient is adequate

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

22. The care of the trauma patient is better on weekends.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

23. The level of care required for trauma patients is too complex for the resources available on my ward.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

24. I have regular inservice / education on the care of a trauma patient.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

25. I keep up to date on trauma patient care by regularly reading literature.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

26. Care of the trauma patient would be easier by having one person coordinating care.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

27. If there was a trauma nurse coordinator/trauma case manager, I would access that person to help provide trauma care.

Strongly Agree Agree Uncertain Disagree Strongly Disagree

☐ ☐ ☐ ☐ ☐

PLEASE TURN OVER

To help us analyse the data, could you please tick answers as appropriate

☐ Male ☐ Female

What is your position ?

☐ RN ☐ RMO ☐ Registrar ☐ NUM

☐ CNS ☐ Intern ☐ Consultant ☐ CNC

How many years have you been involved in caring for trauma patients?

☐ < 1 year ☐ 1 – 2 years ☐ 2 – 3 years ☐ 3 – 4 years

☐ 4 – 5 years ☐ 5-10 years ☐ 11-19 years ☐ > 20 years

If you are a nurse what qualifications applicable to trauma care do you have?

☐ None ☐ EMST Observer ☐ Emergency Certificate

☐ TNCC ☐ Post-Grad Degree ☐ ICU Certificate

☐ Other _____

What area of the hospital do you work in?

☐ ED ☐ HDU ☐ ICU ☐ Surgical Ward ☐ All of the above.

Appendix 3: Staff Satisfaction Survey Post TCM trial

We are evaluating the effectiveness of the trauma case manager following the 6 month trial of the role. As you are aware, not all trauma patients were able to be part of the study due to resource limitations.

Please respond to the following statements in relation to trauma case managed patients that you have cared for. Please indicate by ticking (✓) the appropriate box.

1. Pain management improved for trauma patients when they were trauma case managed

Strongly disagree ☐ disagree ☐ uncertain ☐ agree ☐ strongly agree ☐

2. Radiology, such as xrays were conducted and reviewed more efficiently in patients that were trauma case managed

Strongly disagree ☐ disagree ☐ uncertain ☐ agree ☐ strongly agree ☐

3. The trauma nurse coordinator increased the speed of allied health referrals, such as OT, physio, social work.

Strongly disagree ☐ disagree ☐ uncertain ☐ agree ☐ strongly agree ☐

4. The trauma nurse coordinator increased the speed of other medical team referrals, such as orthopaedic and pain teams.

Strongly disagree ☐ disagree ☐ uncertain ☐ agree ☐ strongly agree ☐

5. I was more aware of the management plan for the trauma patient when they were trauma case managed.

6. The discharge of the trauma patient was more efficient when they were trauma case managed.

Strongly disagree disagree uncertain agree strongly agree

☐ ☐ ☐ ☐ ☐

7. Information documented about the care of trauma patients improved.

Strongly disagree disagree uncertain agree strongly agree

☐ ☐ ☐ ☐ ☐

8. The coordination of the trauma patient's care is better on the days the trauma coordinator works.

Strongly disagree disagree uncertain agree strongly agree

☐ ☐ ☐ ☐ ☐

9. I found the trauma nurse coordinator role.

Not useful uncertain useful very useful

☐ ☐ ☐ ☐ ☐

10. The overall quality of care for the trauma case managed patient.

Decreased was unchanged uncertain improved

☐ ☐ ☐ ☐

11. What is your position?

Nurse NUM Intern/RMO Registrar

☐ ☐ ☐ ☐

Appendix 4: Costings for staffing for full implementation of TCM

Current Staffing.

	MON	TUE	WED	THU	FRI	SAT	SUN
CNS	10 hrs 7 – 5.30	10 hrs 7 – 5.30					6 hrs 9 - 3
CNS			10 hrs 7 – 5.30	10 hrs 7 – 5.30	10 hrs 7 – 5.30		

Total Staffing.

1 x CNS @ basic rate x 30 hrs = $42925.26
1 x CNS @ basic rate x 20 hrs = $28616.84
TOTAL = $86,928.46
1 x CNS @ Sunday penalties x 6 hrs = $15386.36

Proposed Staffing.

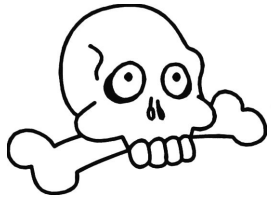
	MON	TUE	WED	THU	FRI	SAT	SUN
CNC	10 hrs 7 – 5.30	10 hrs 7 – 5.30	10 hrs 7 – 5.30	10 hrs 7 – 5.30			
CNS				10 hrs 12 – 10 30	10 hrs 12 – 10 30		
CNS						10 hrs 12 – 10 30	6 hrs 9 - 3
RN	6 hrs 4 – 10.30	6 hrs 4 – 10.30	6 hrs 4 – 10.30		6 hrs 4 – 10.30		

1 x CNC @ basis rate x 40 hrs = $72501.55
1 x CNS @ 10% penalties x 20 hrs = $31796.49
1 x CNS @ Saturday penalties x 10 hrs = $21500.11
TOTAL = $177,008.49
1 x CNS @ Sunday penalties x 6 hours = $15386.36
1 x RN 7th year @ 12½% x 24 hours = $35823.98

Additional hours = 44 hours.

Additional costs = **$90,080.03**

The additional staffing will provide 1 x FTE for the role of Case management and Coding plus additional resources for weekend coverage. The savings made from Coding errors and reduced LOS would realise significant savings in addition to funding the extra nursing resources required.

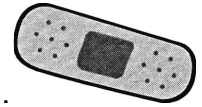


HAVE YOUR SAY ABOUT LOOKING AFTER A TRAUMA PATIENT

The Trauma Service of St George Hospital is conducting a series of focus groups to determine levels of nursing job satisfaction whilst caring for a trauma patient. This is a confidential forum to voice any positive or negative issues you may have.

We need volunteers to be part of small focus groups that will last about 45minutes (in in-service time). We would also like to repeat the group in about 6 months, to see if any aspects of your job may have improved (or gotten worse!)

Please put your names on the list below or talk to your NUM. You could also contact Kate Curtis #019 (trauma coordinator) or ---------- (CNC Emergency) #---. We would like to conduct the groups asap.

We look forward to hearing what you have to say  .

Appendix 6 – Statistical power analysis for future investigation.

Utilizing Altman's method:

The LOS for trauma patients included in the TCM study are as follows.

	Pre trial	In Trial
n	327	149
x	5.897	5.852
sd	7.650	8.281

If we want to find out if the trial reduced the LOS by 1 day with an alpha of 0.05 and a ß of 0.2 and the sd is 7.7

The standardised difference = min clinically significant difference

Standard deviation

$$= \frac{1}{8} = 0.125$$

Using a nomogram for a two sample comparison of a continuous variable, relating power, total study size, the standardised difference and significance level says we would need a total sample at 2,000 (1,000 in each group). If the minimum significant difference is 2 days then the total sample size in each group required is 250.

This method assumes that the variable being measure (LOS) is roughly normally distributed. The LOS of the TCM patients is not normally distributed, thus using an alternate method described by du V Florey (1993)

$$n = \frac{2(d+ß)^2 \underline{s}^2}{d^2}$$

With a d of 0.05 and a ß of 0.2 we insert the following values

$$n = \frac{2(1.96 + 0.84)^2 \underline{s}^2}{d^2}$$

$$= 15.68 \times \frac{s^2}{d^2}$$

for a d=1 (or a difference of interest of 1 day decrease in LOS)

$$n = \frac{15.68 \times 8^2}{1^2}$$

$$= 1{,}003$$

This means we need 1,003 patients in each group (pre and in trial) to demonstrate a significant difference if the LOS is reduced by 1 day.

Using the same method, with d=2, 250 patients are needed in each group.

If we look at the more severely injured group who in the pilot study had an n=134 pre trial and n=68 in trial, sd=10. Using the above formula and d and ß values, to demonstrate a significant difference if the LOS is reduced by 1 day 1568 patients per group are required. If a 2 day difference is considered, 392 patients are required in each group.

Betta Book Binding
M & D Morrisey 4261 2998
26 Fields Street
Kanahooka NSW 2530